DIGITAL PUBLISHING SPECIAL REPORT

Macworld

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OCTOBER 1999

In association with Adobe

Tomorrow's publishing today

PDF: the new PostScript

Adobe InDesign indepth

True colours

Five reasons to open up a Power Mac G3.

1. Because you can.

2. To admire the Pentium-beating* G3 processor running up to 450MHz.

3. To install up to 100GB of internal disk storage without scraping a single knuckle.

4. To install up to a full gigabyte of internal memory in less than two minutes.

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Special report

It was a mutually beneficial thing when Adobe invented PostScript and Apple was first onboard with compatible laser printers. Aldus was there, too, with the original desktop publishing tool, PageMaker. Good for them, essential for all of us.

PageMaker and PostScript dovetailed beautifully - and they worked well only on the Mac. DTP, and finally the Macintosh, boomed. Publishers and graphic artists loved the new way of working because, with the Mac's graphical user interface, it simplified the previously arcane and cumbersome. Little wonder Adobe's PostScript has been called "the most important software in personal-computing history".

But, as in all fields of personal computing, constantly improving processor power combined with the limitless imagination of its users meant that even the simplified PostScript workflow steadily became inefficient - with vast numbers of gigantic files plodding between creators, clients and service bureaus. Several times.

Thankfully, we are on the first steps of a new publishing paradigm. And Adobe and Apple are at the cutting edge yet again. Adobe's Portable Document Format (PDF) replaces PostScript at the heart of tomorrow's digital-publishing workflow.

Nearly 15 years after PostScript, PageMaker and the Macintosh, this new chapter in publishing again promises fewer stages, smaller file sizes and more-intuitive tools. And Apple's ColorSync is way ahead anything on Windows, where colour-management is still in its infancy - despite Microsoft's recent ICM 2 system.

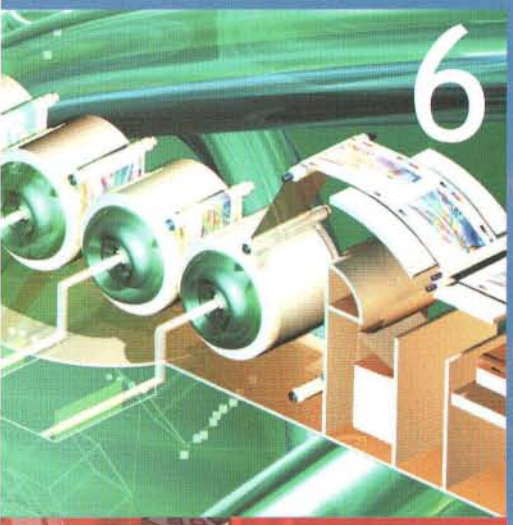
And PDF inventor and PageMaker developer Adobe even has a smart new program that wraps up all the elements in one familiar package: InDesign. A whole new program to learn, you groan. Well, fear not - if you're already friendly with Adobe's other market-leading tools, such as Photoshop and Illustrator, InDesign is only going to shock you with its wonderfully graphical approach to page design and pre-press production.

To prove - to ourselves as much as anyone - that this promised revolution in digital publishing is already a reality, we planned, produced and printed this *Macworld Report* using only the tools mentioned above. Pages were created using Adobe InDesign and a professional ColorSync-managed system on the latest G3 Power Macs. Single PDF files were sent via ISDN to our printer, skipping the costs and complications of the service bureau for a much-simplified computer-to-plate workflow. Even the ads were printed in our totally digital environment: no flimsy film, no costly Cromalins, and no jaded Jaz disks.

It wasn't all plain sailing, believe me... These are new ways of working, after all. But, we can certainly attest to the fact that, post-PostScript, the potent combination of Adobe's PDF and InDesign with Apple's smart ColorSync and super-fast G3 Power Macs heralds the dawning of a bright new era for publishers and graphic designers alike.

- Simon Jary *editor@macworld.co.uk*
Editor-in-Chief, *Macworld*

InSide



6 PDF feature

What next after PostScript? Adobe's Portable Document Format: promising far-smaller file sizes, embedded fonts and graphics, cross-platform document sharing, and easy editing.

18 InDesign workshop

From the makers of PostScript, PageMaker, and PDF comes a thoroughly modern graphical page-layout program, Adobe InDesign. If you're familiar with Photoshop or Illustrator, you're going to love this.

26 Colour feature

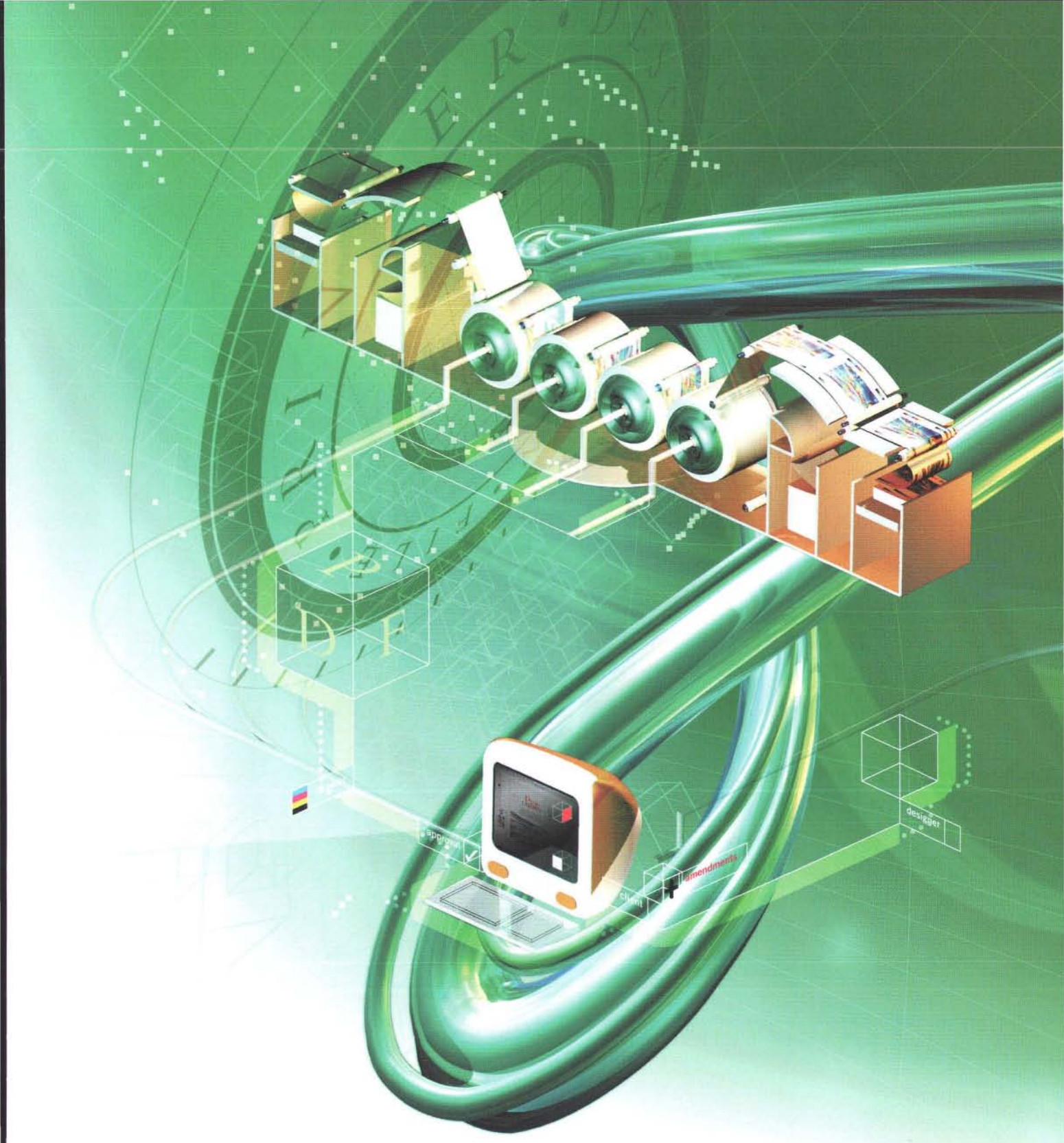
It's been a dream for too long: Now is the time to bite the bullet and colour-manage your production workflow. We explain the do's and don't's of ColorSync-based calibration, profiling and proofing.

Case study

14 Workflow case study
PDF and CTP are already in common use by publishers and printers alike. Michael Walker highlights the pioneers.

32 Colour case study
ColorSync guru, Elie Khoury, takes a look at InDesign's methods of pre-press colour-management

34 PDF on the Web



The big

Simon Eccles introduces you to the world of PDF, as it stands today - and where it's going tomorrow.

Although we've got used to it, today's PostScript-based workflow is inefficient – enormous file sizes and vast numbers of files; all of which must be written to disk, corrected, rewritten, rechecked, re-sent...

There seem to be more steps undertaken after a job is 'completed' than during the actual creative process! Then there's the font issues, quality bugbears, compatible skill sets... It's a wonder we haven't all gone back to Letraset and Cow gum. Today's workflow works, it just doesn't flow.

Thankfully, Adobe's Portable Document Format (PDF) provides a far-superior format for the final-form delivery of electronic documents. PDFs can be shared across platforms (Mac, Windows, Unix). Anyone you send a PDF to can view and print it without the original application program. Even the graphics and fonts are embedded right there in the file, and can optionally be compressed to keep the file sizes down. PDFs retain their original look and feel, are completely searchable, as well as outputing on any printer.

PDF has all the ingredients of a reliable format for transmitting digital masters for production printing. It supports features such as annotations for review cycles, job tickets, composite RGB workflows with ICC profiles (see our colour feature, page 26), repurposing of information and easy archiving.

What is PDF?

PDF is the most important document file format to emerge in the 1990s. It was invented by Adobe to hold the complete contents of a document in a way that is independent of the application software or hardware platform that created the document. A PDF file can be displayed or printed identically on any computer using Adobe's Acrobat Reader – available free for Mac OS, Windows or Unix.

Any document – from any layout, design or graphics program – can be converted into a PDF file, as long as it is compatible with a PostScript printer driver; this means practically any text, layout or graphics file. The process saves the whole contents of the document – layout, text, graphics, placed images, fonts – into a single PDF file.

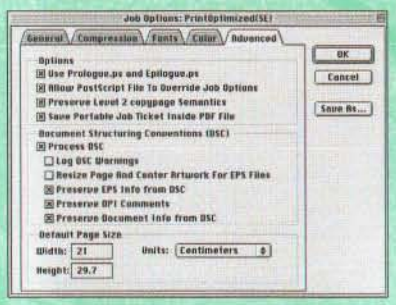
Originally, PDFs could be created only by Adobe's own Acrobat program, which is a suite of creation, reading and editing utilities. This provides two PDF creation routes: the basic PDF Writer, and the full-function Distiller (see later for details). With PDF growing in popularity, third-party programs are increasingly providing direct links to Distiller, or building in their own equivalents.

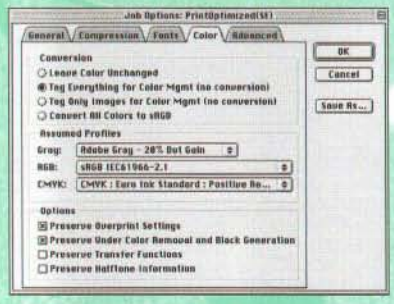
Platform independence means that documents can be archived on one computer, then read and printed on practically any other computer. Most Mac vs PC document and font compatibility problems simply vanish – in theory.

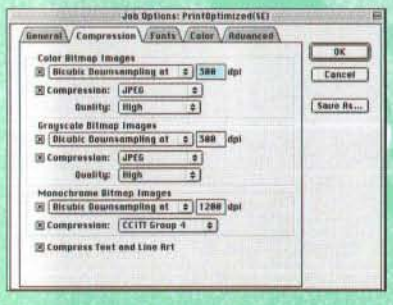
In pre-press circles, the single file immediately solves two of the biggest customer-to-

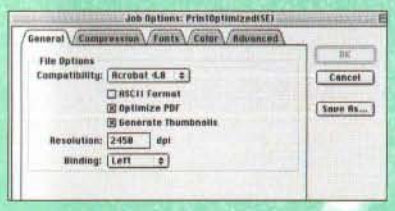
switch

The Job Options menus are vital for creating PDFs that suit the type of work you're doing. Acrobat 4.0 supplies pre-set 'optimizations', but you can create and save your own, or import sets supplied by a service bureau.

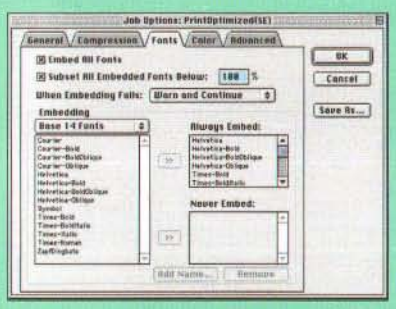








Font options



bureau problems – picture files that go missing, or fonts that aren't available. However, note that 'Save-for-bureau' routines or stand-alone pre-flight and collection applications will also collect all the elements of a job automatically, as long as you set them up properly.

Because PDF is a sort of partially pre-processed PostScript, any major problems tend to show up at the customer-creation end, rather than in the bureau's RIP – when things can get expensive. If a customer can successfully convert a document to PDF, chances are it will print without PostScript errors or missing elements. This can give a false feeling of security – there are still plenty of opportunities for customer errors, such as spot or CMYK colours that should be composite RGB (or vice versa), placed images at the wrong resolution, and problem fonts (mainly TrueType). Most specialist pre-flight programs on the market now check PDFs, as well as applications or PostScript files.

PDFs can be compressed to make much smaller files than the original documents. The Adobe Distiller PDF creation program and its in-program equivalents offer a range of compression options for different types of image format, text and geometry.

In addition, the PDF files make very efficient printing code – because they are flattened to a single layer, so there are no hidden elements taking up unnecessary space. Even without compression, PDF files are typically one third or more smaller than equivalent PostScript files generated by applications.

The PDF file format has been extended over the years, and the latest version, introduced with Acrobat 4.0, is PDF 1.3. This has more multimedia- and Web-related features, and also has full support for the latest PostScript 3 printer features.

Creating PDFs

A good place to start is with Adobe's own Acrobat package, which costs £149. The new Acrobat 4.0 is available for Mac OS and Windows 95/98/NT, with a more basic version available for Unix platforms. A 'platform-independent' Java PDF Reader is currently in Beta.

Acrobat 4.0 supplies several components. The main program, confusingly also called Acrobat 4.0 (it used to be called Exchange in v3.0), lets you open PDFs, view them on-screen, edit them to some extent, and print them. There's also the free PDF Reader (which also prints). This is often given away with third-party programs that have instruction manuals in PDF form. It is also included on *Macworld*'s cover CD.

The two PDF creators are called PDF Writer and Distiller. These are basic print menu programs that are of little use in professional print – because they can't handle placed EPS files, or CMYK colours, and there's no control over font embedding or compression.

The full-function PDF creator for Macs and PCs is called Distiller, and in its new v4.0 form has been improved with new print and Internet-friendly features. It also has better automation, taking out a lot of the hassle of using it.

Acrobat Distiller presents you with menu options that can automatically interpolate resolutions up or down to a standard setting for different types of image (colour or mono photograph, line art), set lossless or JPEG compression levels independently for different image types, and embed some or all of the fonts. Settings can be saved under different names and recalled through a pull-down Job Options menu. The three Job Options supplied cover optimization for on-screen reading, desktop printers or pre-press for printing presses.

The new Distiller 4.0 allows you to save settings files separately, and to transfer them to other users. As customers may struggle with the arcane options, it's now possible for print companies to create proper settings and supply these to their clients.

Working with fonts

The font-embedding options in Distiller are particularly important for professional print and design. If you leave font embedding off, then Acrobat will call up substitute fonts for anything not present on the reader's system or printer, giving results you might not have wanted.

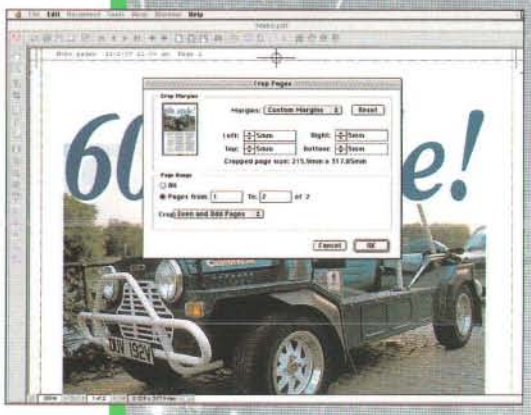
Font embedding builds the font display and printing information into the PDF, which increases the file size – but ensures accuracy. To be absolutely safe you should also choose to embed the Base 14 fonts – although these are present on any PostScript device, they do show minor variations, which embedding in the PDF avoids.

For critical design work, you should choose the 'Subset All Embedded Fonts Below' tick box, and set this to 100 per cent. This triggers a useful tweak where Distiller gives each font a unique name, just for that file. This again ensures that there's no chance of the printer using an old resident font with the same name, instead of that in the PDF.

You can use Distiller to convert PostScript (.PS) files, created by a printer menu's 'print-to-file' option, to PDFs. However, that's a rather convoluted way of doing it. The new v4.0 includes improved automatic Distiller selection through the print menu on a Windows PC or Mac, and the PostScript stage is automatic. You can also set it up to work with watched folders associated with different settings – any PostScript file you drag into a folder will be converted to PDF.

Adobe claims that its earlier problems with TrueType and printing have been overcome with Acrobat 4.0 and PDF 1.3, but says that there won't be absolute compatibility until the forthcoming OpenType fusion between PostScript and TrueType arrives. Better stick to PostScript, whenever you can.

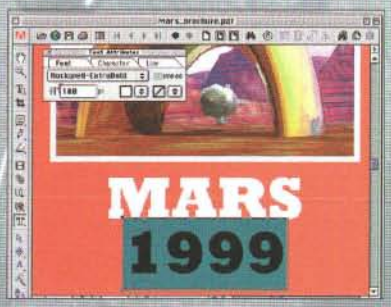
Below: A new feature of Acrobat 4.0 is the ability to crop existing PDF pages, either numerically or by drawing a selection on the preview.



Acrobat Capture

Adobe makes a stand-alone program called Acrobat Capture 2.0 (Windows only), that lets you scan existing printed documents into a computer and save them as PDFs. There are options to run OCR recognition of text and embed the ASCII code as well as the appearance of the pages into the PDFs, meaning you can perform searches and editing on the text.

A stripped-down version of Capture is included in the Macintosh version of Acrobat 3.0 and 4.0.



Above: Text editing in Acrobat 4.0 has been extended, though it will only alter individual lines and cannot re-flow.

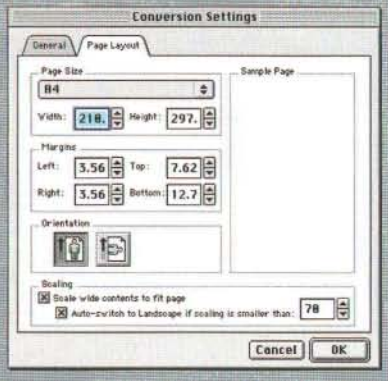
Editing PDFs

Originally, PDF was designed as a closed format, to stop anyone altering documents. This made sense in the corporate documentation world, but not in design and pre-press circles, so Adobe and third parties have developed ways of altering PDF content and presentation. However, you can still set security levels in Acrobat 4.0 to prevent editing, or even printing.

Adobe's own editors are Acrobat 4.0 and Illustrator 8. Acrobat 4.0 has facilities for editing text (but only line-by-line with no reflowing), changing fonts, changing colours, and cropping pages to new sizes. Images can be edited if you have a compliant program, such as Adobe Photoshop or Illustrator.

Illustrator 8 is a more extensive editor, but works on only one page of a document at a time. All outline objects can be edited or deleted, and you can add new ones. Text editing works on only single lines. Adobe InDesign 1.0 was supposed to include an advanced PDF editor, but this has been postponed (see later).

Above: Web Capture converts Web pages to PDF.
Below: you can set the Captured page size to fit your printer.



Third-party creators and editors

Several third-party applications and utilities can output PDFs, or edit and re-output them, but most of them rely on the presence of Distiller on your system.

One exception is 5D Solutions' PDF Creator 1.5, a lower cost (£69) alternative to Distiller, accessed through the printer menu, with better printing features. This is an upgrade of 5D's NikNak 1.1 program, and currently runs on Windows only, though a Mac version is in Beta for imminent release. PDF Creator can output only PDF 1.2 formats: plans to add PDF 1.3 as an interim upgrade have been shelved in favour of a PDF 1.3-compatible Creator 2.0 at the end of this year.

CorelDraw 9 can open (slowly) and edit PDFs, though so far we haven't managed to open one that hadn't been scrambled along the way. It does, however, have an excellent built-in PDF 1.2 writer, similar to Distiller, that works really well. The Mac version will be available in September.

You can output PDFs directly from Adobe Illustrator 8, which relies on PDF Library, a module developed by Adobe to provide PDF read/write capability for its other applications. Illustrator can also open PDFs page-by-page, and lets you edit practically any element, or add new ones, then re-export as PDFs or convert to other formats.

PDFs can be opened and edited in Adobe Illustrator and a few other design programs. Illustrator 8 has impressive PDF support.

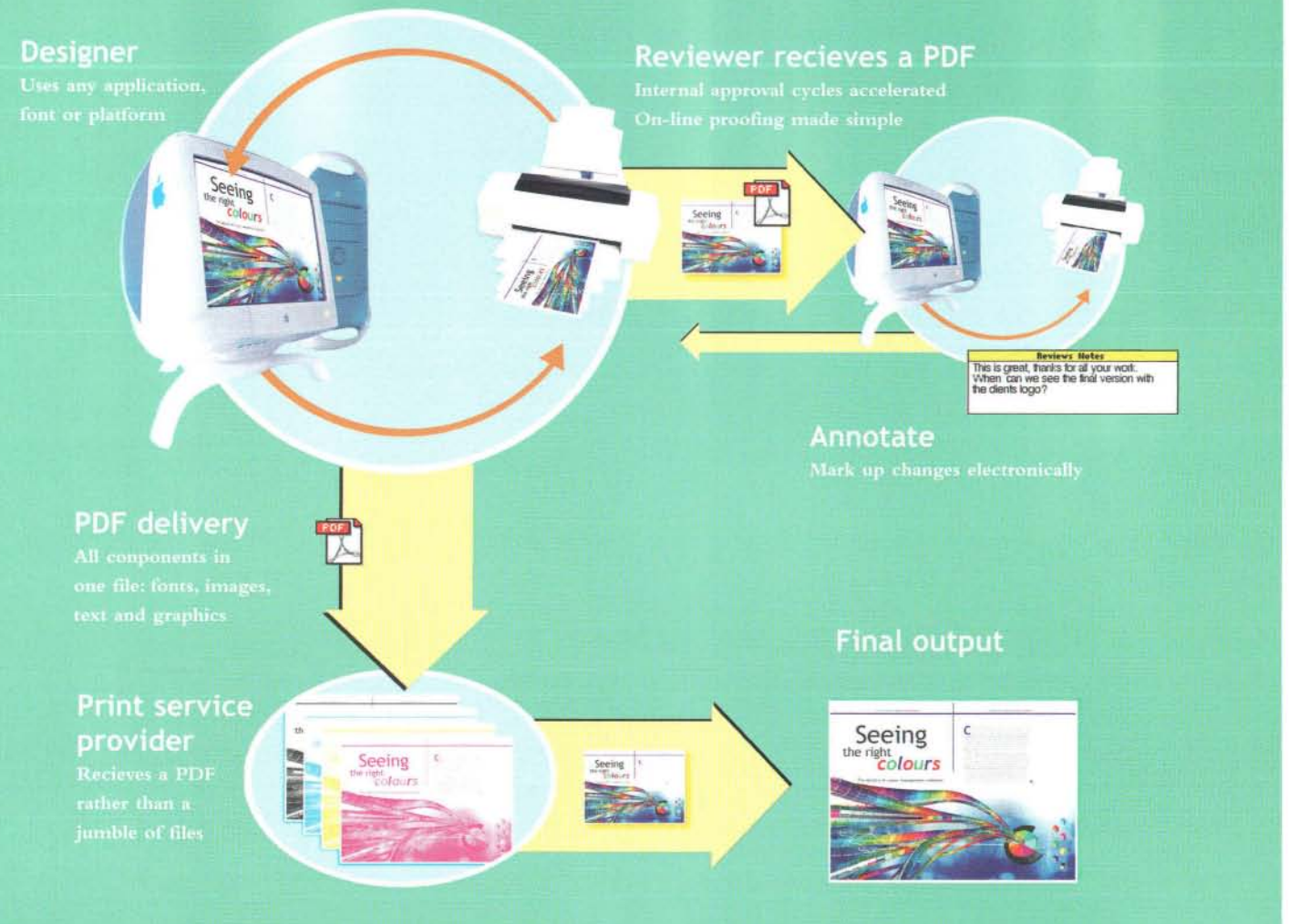
Adobe PageMaker 6.5 Plus relies on Distiller to create PDF files. PageMaker includes Distiller 3.0 that creates PDF 1.2; if you have Distiller 4.0 installed, it can create PDF 1.3. It can open and place PDFs, but cannot edit them.

Belgian developer Enfocus built up a good reputation with its PitStop 2.0 utility, a plug-in for Acrobat Exchange 3.0 that gave extensive editing features of most elements in a PDF – similar to those in Illustrator. Enfocus is now shipping the improved PitStop 4.0, which is compatible with PDF 1.3. It adds the ability to re-flow paragraph text, and also has some of the pre-flight abilities of the Enfocus CheckUp PDF checker.

Another big developer is the German callas software. Its £199 pdfToolbox provides an improved front-end to Acrobat Distiller with optional multi-function batch processing, plus modules for checking contents, controlling crop marks, and PDF-to-EPS conversions. callas MadeToPrint XT Plus 4.0 is a QuarkXTension that exports PDFs and other formats, and has basically the same feature set as Distiller 4.0 – but with some useful tools for setting up interactive features within the PDFs. callas has recently introduced pdfOutput Pro, an Acrobat plug-in that can create separations from composite CMYK PDFs, as well as control in-RIP separation on a PostScript Level 2 or PostScript 3 RIP.

Lantana Software's CrackerJack 3.0 also provides control over in-RIP separation, as well as a range of professional output controls for PDF 1.2 and 1.3, including

Authors work as they are accustomed



colour management, separations, cropping and scaling. Also worth a look is UK-based Quite Software's A Box of Tricks, which can fix a range of common problems as well as converting RGB to ICC-managed CMYK or greyscale.

Placed PDFs

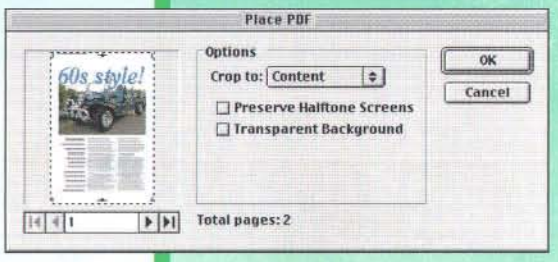
Importing PDFs into layout programs such as QuarkXPress or PageMaker has always been possible, but only by using Acrobat to first export the required PDF pages to EPS.

A handful of layout programs can now import multiple PDFs into the page and treat them as if they were EPS files. Adobe's Placed PDF technology is built into PageMaker 6.5 and InDesign. It has also been licensed by Quark for the new free PDF Filter 1.1 XTension, downloadable from **www.quark.com**.

The much-delayed arrival of Placed PDFs should please newspaper and magazine producers, who see the potential of PDFs as a standard delivery format for classified and display advertisements from outside agencies. Ad agencies love to use distinctive typefaces, but this is a production nightmare for publishers who have to be able to open the ad files, check the contents and then track-down and load the correct fonts for output. Converting type to outlines in EPS is only a partial solution, and is inefficient.

At present, most UK newspapers and agencies use an application called 4-Sight ADS (Ad/Artwork Delivery System), which takes a layout file, converts it to EPS, embeds the font outlines, adds a preview image and a copy instruction file, compresses the lot and transmits it to the publishing site. It's automatic and nearly foolproof, but expensive.

Using PDF in place of EPS offers all the same benefits, but with smaller file sizes and therefore faster transmission. As with EPS, copy instructions or other job control data can be embedded in a PDF. Products such as Portland's AdExpress and Alphagraphic System's CI plug-in exploit these capabilities for ad. transmission to newspapers and magzines.



Interactive PDFs

You can display PDFs as fully formatted multimedia pages on the Web or CD-ROMs without needing advanced HTML and CSS programming skills or specialist Web-design programs such as Adobe GoLive or Macromedia Dreamweaver. PDF Web pages look exactly like their printed equivalents, with any combination and positioning of text and images, using any font you like. Text and headline fonts can be embedded, so you're not dependent on the font limitations of the browser that views them (though beware that small fonts that work often look horrible on-screen). PDF Web pages can be zoomed into, and text and vector graphics will preserve their quality.

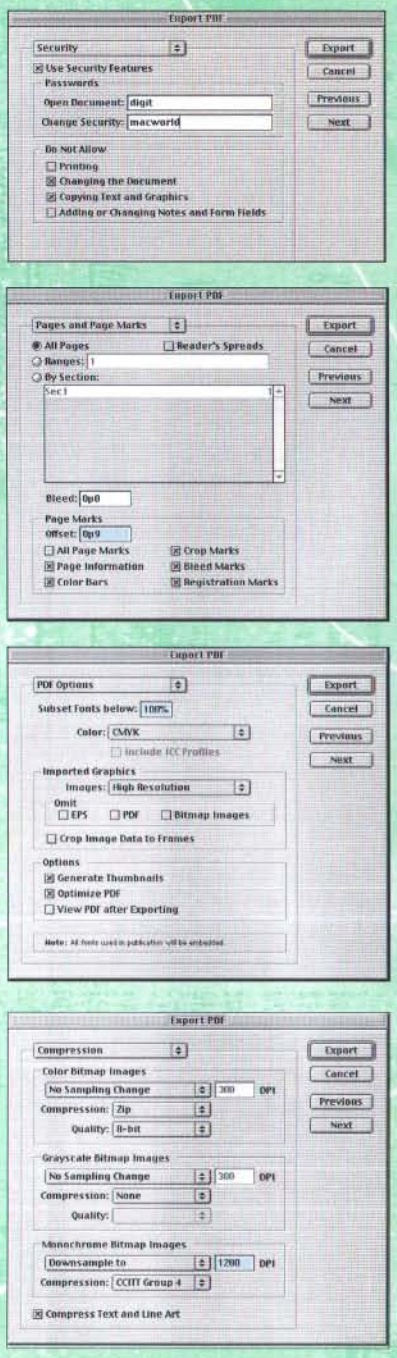
Using the Acrobat 4.0 application (or Acrobat Exchange 3.0), you can add embedded movies or sound, and hyperlinks for navigation across different pages, or links to other Web sites.

It's also possible to preserve hotlinks and a number of other interactive items that have been set up in the original creation or layout programs, providing these support the PDFMarks standard. Programs that support PDFMarks include recent versions of PageMaker, CorelDraw and Macromedia FreeHand. InDesign does not support PDFMarks – it doesn't need to. PDFMarks are special PostScript comments that result in PDF features (hypertext links, annotations, etc.) when processed by Distiller. Adobe FrameMaker provides extensive PDFMark support for carrying through cross references, and fully linked TOC and indexes into a PDF.

Sounds great? The disadvantage of using PDFs on Web sites is that they're slower to load than HTML. You need to convert print-quality graphics within the pages to lower resolutions for the Web, or downloads will be very slow. Fortunately, it's easy to optimize the same document for print or Web using Distiller or a decent third-party equivalent, with automatic resolution down-interpolation and compression adjustment, so a single original document can easily be 'repurposed' for different media.

Top and middle: InDesign supports Placed PDFs, meaning several PDFs can be placed in the same page as if they were EPS pictures.

Bottom: QuarkXPress' new PDF filter is a bit flaky for exports, but allows single-page PDF 1.2 file placement; though not yet InDesign's PDF 1.3 files.



InDesign's PDF Export menu is a slightly simplified replica of Distiller 4.0's Job Options. The page and printers' marks menu is new for InDesign though, and very useful for professional print.

PDF 1.3 and PostScript 3

PDF 1.3 fits in with Adobe's grand strategy for its PostScript 3 page-description and printing language, particularly for high-end pre-press and document-printing work.

Adobe would like us all to start using PDF files as the standard job-delivery medium from customer to bureau, and for automatic-workflow systems. Where most PostScript Level 2 printer drivers had to convert PDF to PostScript for processing, some PostScript 3 RIPs can accept PDFs directly (they can still accept PostScript as well, of course).

The PDF 1.2 format generated by Acrobat 3.0 and most third-party programs lacks a number of features needed for colour pre-press work, and cannot access all of the PostScript 3 functions. PDF 1.3 now supports the complete PostScript 3 feature set. In practical terms, this includes Smart Shading (blends are optimized for the particular RIP and screen), N-colour spaces (ie: multiple-channels, including Hexachrome, colourized TIFFs and duotones). It also supports an all-ICC colour-management workflow, and is compatible with OPI 2.0 image substitution.

Extreme

Adobe's Extreme technology for automatic pre-RIP processing uses PDF for internal working. This was announced a couple of years ago, under the name Supra, and was intended originally as a way to process very large print jobs on multiple RIPs running in parallel.

With the development of much faster, multi-processor computers, the need for parallel RIPs has faded, but the ability of Extreme to run PDF processing sequences automatically is leading to its adoption in automated workflow server systems.

Extreme uses a software module called the Normalizer – essentially an automatic Distiller – which converts incoming application, PostScript or PDF document files into PDF page files. This pre-processing stage makes for smoother, faster running in the RIP, but the clever bit is that it writes a separate PDF for each page, allowing all sorts of possibilities with regard to distributed processing, imposition and the late editing of specific pages in publications.

Extreme forms the core of the Agfa Apogee all-PDF pre-press workflow-management system, which is the fullest implementation on the market. Parts of Extreme are used in the Scitex Brisque pre-press workflow and RIPping system, and a full implementation is due later this year. IBM and EFI also use Extreme in their high-speed digital document printer controllers.

Web Capture

Web Capture is a brand-new feature that has been developed for Acrobat 4.0. It lets you convert on-line or local Web pages from HTML to PDF, store them locally and print them. Web Capture is already shipping with the Windows version of Acrobat 4.0, and is in Beta for the Mac (see *Macworld*, August 1999).

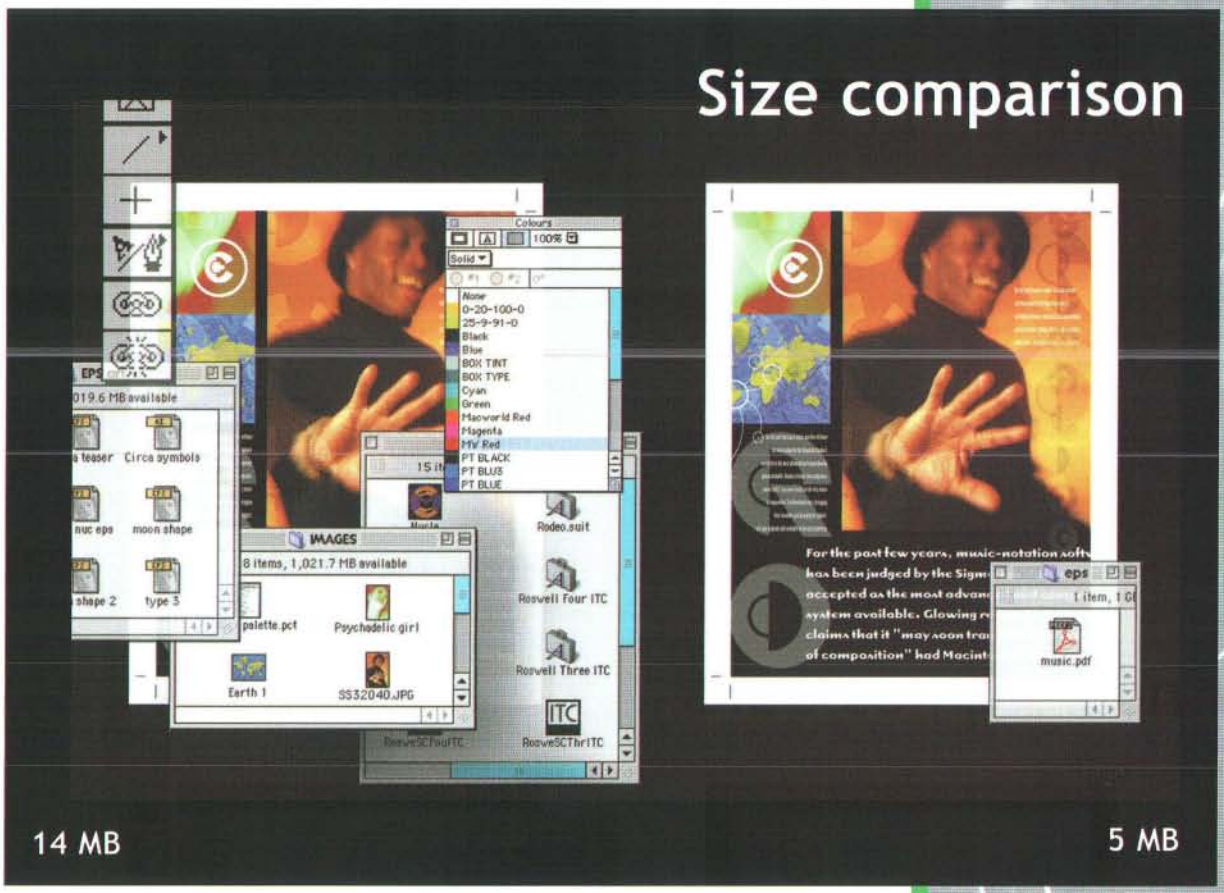
It's a sophisticated plug-in that lets you choose whether to capture a single page, or two or more levels of links, or a complete Web site. Unlike simply saving the HTML code, Web Capture grabs the complete on-screen appearance of the page, with frames, images, background textures and everything else. Pages can be written to fit a page width, such as A4, so you won't lose the right-hand edges when printing.

It can't capture working JavaScripts, such as rollover buttons, but it will include the current-state graphic.

Web Capture is a useful feature that will allow Web designers to keep 'snapshots' of their work and print this easily for their portfolios. Anyone else who needs to download Web pages will appreciate not having to track down all the placed image files or worry about frames and backgrounds.

InDesign

InDesign has the most sophisticated built-in PDF creator to date, and can also place multiple PDFs on a page. One of the features promised for InDesign was the ability to open and edit PDFs, but this has not made it into version 1.0, because the import



plug-in was designed to open PDF 1.2, whereas InDesign exports PDF 1.3. Given Adobe's commitment to PDF, it seems highly likely that the Open PDF feature will appear in subsequent releases, or even as an interim update.

When this arrives, it should be a significant improvement on current PDF editors. InDesign's PDF writer will be able to insert additional object information into PDF 1.3 files at the creation stage. When InDesign opens up one of its own PDFs, it will be able to detect this extra information, in a process called 'round-tripping.' The biggest benefit will be that InDesign will be able to re-create flowed text blocks instead of individual lines, so you'll be able to edit and re-flow text normally.

Both Illustrator and InDesign rely on a software module called PDF Library – an encapsulation of the Acrobat technology into a callable library that applications can call to read, create or change PDF files. Another example of the use of PDF Library is Acrobat Distiller, which calls PDF Library to generate thumbnails or apply security to a PDF. PDFs created by Illustrator 8 or InDesign show 'PDF Library' in the Producer field of the PDF metadata (type command-D in Acrobat to view document information). Interestingly, a paragraph of text in an Illustrator page will remain editable and wrap correctly if saved to a PDF and subsequently re-opened in Illustrator. In the meantime, you can open and edit PDFs in recent versions of Adobe Illustrator (the latest 8.0.1 upgrade supports PDF 1.3), plus EnFocus PitStop 4.0, and re-export as EPS or PDFs.

The InDesign PDF Export menu is similar to Distiller 4.0, except that it is optimized for print output. You get the usual options for interpolating resolution to an appropriate setting, and manual or automatic choice of compression types for placed bitmap files.

PDF export is bullet-proof in the release vsersion of InDesign, and the files it produces open up happily in Acrobat 4.0 or PDF Reader, and can be re-imported into InDesign. This uses the InDesign Place menu, as if the PDFs were normal EPS or TIFF graphics. For multi-page PDFs there's a menu that lets you choose which page to place in each frame. Placed PDFs behave just like EPS files in the page: you can scale them, crop them, rotate them, and do all the usual transforms, but you can't alter the actual contents. It's possible to import multiple PDFs into an InDesign layout, add new text and objects, and either save in the InDesign format or re-export as a new PDF.

CASE STUDY

Putting PDF into practice

by Michael Walker

Printing to a high-resolution imagesetter or direct to plate with CTP isn't a new capability of Acrobat 4.0 – support for high-end colour printing has been available since the introduction of Acrobat 3.0 in 1996. Many UK publishers, printers and repro houses have already recognized the benefits of working with a single, compact file that contains all the information needed to produce high-quality separations or plates.

PDF to plate

One such site is Jarrold Printing (who printed this *Macworld Report*), which adopted CTP in 1997 and has been outputting PDFs to two Creo VLF platesetters since the beginning of 1999. The Norwich-based printer specializes in large business-to-business catalogues as well as personalized direct-marketing materials and magazine printing.

PDF is now being extensively used in printing of both catalogues and direct marketing materials at Jarrold; magazines cannot be adapted so well to the PDF/CTP route because advertisements may arrive as films and proofs from as many as 50 different agencies or repro houses per issue.

"PDF benefits us through reduced file sizes for getting the data in. Some jobs come via ISDN so smaller files means shorter transmission times," says technical manager Andrew Hawkins. "The main benefit is the reliability of the PDF format and the fact that all the necessary resources are embedded in the PDF file – images and, more importantly, fonts."

Hawkins says that PDF image compression, even at its lowest setting, can reduce file size by a factor of up to five or more, with no discernible loss of quality.

Persuading clients to adopt PDF has mostly been straightforward, according to Hawkins: "One customer wanted to supply us with PDF, and we were soon able to get it working well. Some customers were reluctant to change, but when they see the reduction in file size, and realize the other uses to which they can put PDF internally, they see it's a good idea. If a customer doesn't know which format to use, we'll recommend PDF," he says.

Working with PDF and CTP has also simplified the division of responsibilities between printer and client. "Particularly in catalogue work, there's no time for proofs or corrections," explains Hawkins. "The job has to be supplied to us 'fit for purpose'. We don't send proofs to the customer, the job has to be right when it comes to us. The limited editability of PDFs is not a problem – if the file is wrong, the customer supplies us a new one. This is the secret of successful CTP and the only way to meet the shorter deadlines that customers expect."

Magazines aplenty

A printer that is producing magazines from PDF is Cradley Print of Birmingham, which has been working with the technology since the release of Acrobat 3.0. The company, which handles a large volume of consumer and business-to-business titles for customers such as Future Publishing, had been in the forefront of receiving page data from customers. But it was facing the usual problems with application files, missing or wrongly formatted images and fonts, as managing director Chris Jordan explains:

"We needed a reliable page format. PDF gave us this reliability, portability (in terms of file sizes) and convenience. We're now doing about 8,000 pages a month from PDF," he says.

Cradley sends its PDF files to a Scitex Brisque front end, driving a Lotem platesetter and three Dolev 800 imagesetters. Advertisements supplied as films are digitized using a copydot scanner; other ads come in as application files, and a few as PDF.

Getting the publishers to supply PDF pages has been quite straightforward, reports Jordan. However, the advertising side has been more problematic. "Many of the agencies and their repro houses don't know how to put PDFs together, and there's a 'why break it if it's fixed?' mentality," he comments. "It's hard to get some repro houses to move away from the idea of supplying film, to the idea of supplying data."

From the publisher's point of view, Jordan says the benefits are in convenience

You don't have wait for Adobe InDesign to take advantage of the benefits of a PDF-based workflow. Michael Walker spoke to various users in repro and printing who are already reaping the rewards of PDF.

and control. "PDF files are easy to create and easy to move around because of their smaller size. Publishers can place high-resolution images themselves by doing their own scanning or by buying scans in, avoiding the lo-res/hi-res substitution cycle. The more steps you have, the more potential error points there are. Working this way takes some of these errors out, making the process more cost-effective."

Building on the all-digital workflow idea, Cradley has developed a remote-proofing system that allows customers to log in to a secure server via a Web browser and see RIPped files in colour for final sign-off. Called RAS 3 (which stands variously for Remote Approval System, Remote Archive Solution and Remote Advertisement System), this allows both editorial and advertising customers to check that their pages have imaged correctly, and they can even measure percentage tints in the rasterized pages to confirm CMYK colour accuracy.

This vastly speeds the approval process compared to the usual hardcopy proofing cycle. Jordan cites the example of a European edition of a US magazine that Cradley prints:

"PDFs of the pages are made in Detroit and sent to us over the Internet by FTP. We RIP the pages and make the files available on our Web server. The people in Detroit look at them and give us approval without producing a single hard proof. It's knocked three days off the schedule."

Jordan's view on the acceptance of PDF in pre-press is that "The biggest issues are business issues, not technical ones. The technology is mature and it works; what we have to face up to is the issue of people taking responsibility for their stages in the PDF workflow – they should supply the same file as the one from which the proof was made, not a different one and it should be pre-flighted.

"We were getting more and more of a checking burden put on us, but we couldn't be responsible for all of it. If everyone involved in the process picks up their responsibilities it works, and we've proved it."

From newspapers to scientific journals

Cambrian Printers of Aberystwyth, Wales, is a printer of scientific and technical journals that has also been working with Acrobat since 1996. Its involvement came about through the changing printing requirements of two regional newspapers – the *Cambrian News* and the *Brecon and Radnor Express* – that the company owned until last year.

At the beginning of 1996, Cambrian was successfully sending PostScript files for mono newspaper pages via ISDN to remote printing sites in Swansea and Dursley. Advertiser demand then prompted the introduction of colour, which in turn put file sizes and transmission times up.

Cambrian's IT projects manager Tim Williams was aware of Acrobat, but had initially dismissed it. He looked at it again at a friend's suggestion and after some trial-and-error testing, was able to get the process working correctly and both newspapers were successfully converted to PDF production in summer 1996.

The PDF printing technique came to the attention of one of Cambrian's major customers, scientific journal publishers Chapman and Hall. They were sufficiently impressed that, as Williams recalls, "at a meeting with prospective printers, they announced in effect 'we have £4 million of printing to place; if you can't accept PDF you won't get any of it'."

Having set the PDF ball rolling, Cambrian not surprisingly picked up plenty of the Chapman and Hall work. The number of journals to be printed from PDF increased to the extent that Cambrian instigated formal quality-assurance procedures for PDF, whereby

specifications for Acrobat Distiller settings and related parameters were issued to the various editorial teams.

In the early days, Williams and his colleagues were opening the PDFs in Acrobat Reader and printing to PostScript files for imposition and output on a 4-up imagesetter. That setup has now been replaced with Preps imposition templates and 8-up imposition on a Scitex Brisque Impose system outputting to a Lotem platesetter.

"We get the PDF files via ISDN or on CD. Regular publications have pre-built imposition templates, so we feed the files straight into them and hence into Brisque Impose. We don't even have to open the PDFs – though we do for quality checking," says Williams. "The key is quick supply of data, fast processing and no planning up to do."

The reliability of the process is such that Cambrian prints a leading medical journal for the US Heart Foundation that is originated in Baltimore, Maryland. Files are sent via FTP to the Aberystwyth plant, but no proofs are run, the job is just printed and dispatched.

"Customers get fast turnaround and responsibilities are clearly defined, which makes for a better working relationship," says Williams. "We've even bought and installed Acrobat for customers. It's more

CASE STUDY

Putting PDF into practice (continued)

economic for us to install it and show them how to use it, so we can sit back and receive PDFs.

"About 65 to 70 per cent of our work is coming in as PDF now and we've been running a travelling roadshow to present the idea to groups of publishers," he adds.

Fast turnaround digital printing

Similar workflow advantages are coming from PDF, in a digital-printing environment, at LB Group in London. Including Laserbureau, the South East's first DTP PostScript bureau which opened back in 1986, LB Group includes integrated design, new media, repro, digital and conventional offset printing services.

A particular speciality of the group is short-run, fast-turnaround digital printing, which is carried out either on Xerox DC40s or on a Heidelberg DI digital press. The use of PDF has been instrumental in achieving extremely short turnaround times, as managing director and co-founder Gary Duff-Godfrey explains:

"Our clients can now send me a job like a financial leaflet with tints and small amounts of colour via email, which I pick up on my laptop and then download to the DC40. Within 30 or 40 minutes of receiving the job, it's printed and on the way back to them."

LB Group's customer base is diverse, as is its workload, which can range from two-page A4 documents in the 50 to 2,500 print range to half a million corporate mailers. Clients include Marks & Spencer and the Electricity Pool, the regulatory body for the regional electricity supply companies.

Duff-Godfrey has found that switching clients on to the benefits of PDF has not always been easy. "They've heard of Acrobat but can't always get past the view that it's low resolution, for on-screen proofs and presentations only. Sometimes we take jobs in native file format, distil them and put the PDF into our workflow. We can work faster with the PDF, without having to worry about missing links, graphics or fonts, or the skill level of the operator who's going to run the job," he says.

As well as being an advantage to clients, who get a more efficient and reliable service with smaller and more manageable files, using PDFs has yielded an unexpected benefit to LB Group. Duff-Godfrey explains, "Three years ago we spent about £50,000 upgrading our internal network because file sizes had grown so much. I was looking at having to do the same again this year because it was getting slow again, but with PDF the file sizes have come back down. Thanks to PDF, this particular networking issue can be put on the back burner for a little while longer while we evaluate further the benefits of this technology."

LB Group has also been beta testing Adobe InDesign and has found a very useful role for it in preparing work for the Heidelberg DI press. InDesign can directly place PDFs on the page, so it has been used to create templates for positioning PDF files for output on the digital imaging press. "InDesign looks exceptionally good," says Duff-Godfrey. "Using the templates for PDFs we can work very quickly."

The combination of PDF and digital presses allows LB Group to offer a fast and efficient service. "In my opinion PDF, together with InDesign, will change the way we work and think within the graphics industry. InDesign will help show just how easy and effective a PDF workflow can be. I believe it will become the industry standard."

The agency interface

PDF is finding a different niche in the workflow at Soho-based Tapestry, which provides a range of services to major London and country-wide advertising agencies and publishers.

Tapestry's work in press display advertising involves receiving digital artwork from ad agencies, adding high-resolution scans, producing proofs for agency and client approval, then producing final film and proofs for delivery to the newspaper or magazine publisher. Typically jobs are received by Tapestry in QuarkXPress format and are worked on further in that application. However, technical director Chris Bunnett has been experimenting with PDF both for output of films, and as a means of developing a Web browser-based system for artwork identification and approval.

"We typically have some 2,500 files available on our network at any one time," says Bunnett. "Of these about 60 per cent are current campaigns. The sales order staff spend a lot of time responding to agency queries of the 'have you got this ad in A4 format?' or 'is it the one with such-and-such text in it?' variety. Making PDF versions of all the ads as they are done makes it simple for staff to view them and confirm the content without cross-platform problems or having to have all the right fonts installed to open jobs up in XPress and view them."

The logical extension to this is to make the PDF files directly available to agencies via the Internet, so that they can check current campaigns themselves. Bunnett and his team are currently working on a database system, with a Web browser interface, that will make this possible. Agencies – and potentially their clients – will be able to see complete details of all bookings and specifications, and then to view the advertisement artwork in PDF for final confirmation.

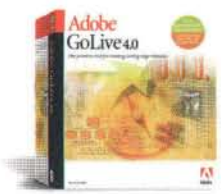
Some newspapers, notably the *Daily Express*, will accept advertisements supplied in PDF, but Bunnett has also experimented with using PDF as the output format at Tapestry for producing films. The company has recently upgraded its Fujifilm Celebra NT RIP to full PostScript 3 capability, enabling it to accept PDFs directly.

"We've had jobs that wouldn't RIP from PostScript files, but which would run from PDF," comments Bunnett. "We've also found that we get much better performance from our Digital Cromalin system when we output from PDFs rather than from native files."

Bunnett feels that PDF will ultimately be the format of choice: "PDF is a unifying medium. It provides a uniform environment, and solves the multiple file formats problem for complete documents in the way that EPS and TIFF have done for vector art and bitmap images. It's a generic format that gets rid of font problems. If I get a job in PDF, I know I'm going to be able to open and run it."

Web design and coding just evolved to a higher level.

Adobe® GoLive™. The natural selection for every web designer.



If coding is the genetic fingerprint of web design, then the evolutionary ladder has just moved up a rung. That's because Adobe GoLive lets you create stunning and highly functional web designs without having to write one line of HTML. GoLive generates code automatically and even provides you with ready-to-use Javascript actions. Best of all, GoLive is available for both Mac and PC platforms, so you can design and develop wherever you're most comfortable. Now, you can push your designs to new levels of artistry and interactivity, confident that GoLive will ensure they look great and work together seamlessly when posted. To find out more about the origin of this exciting new species, contact any good local reseller, Adobe Systems UK on 0181 606 4001 or visit us at www.adobe.co.uk. You won't be disappointed!

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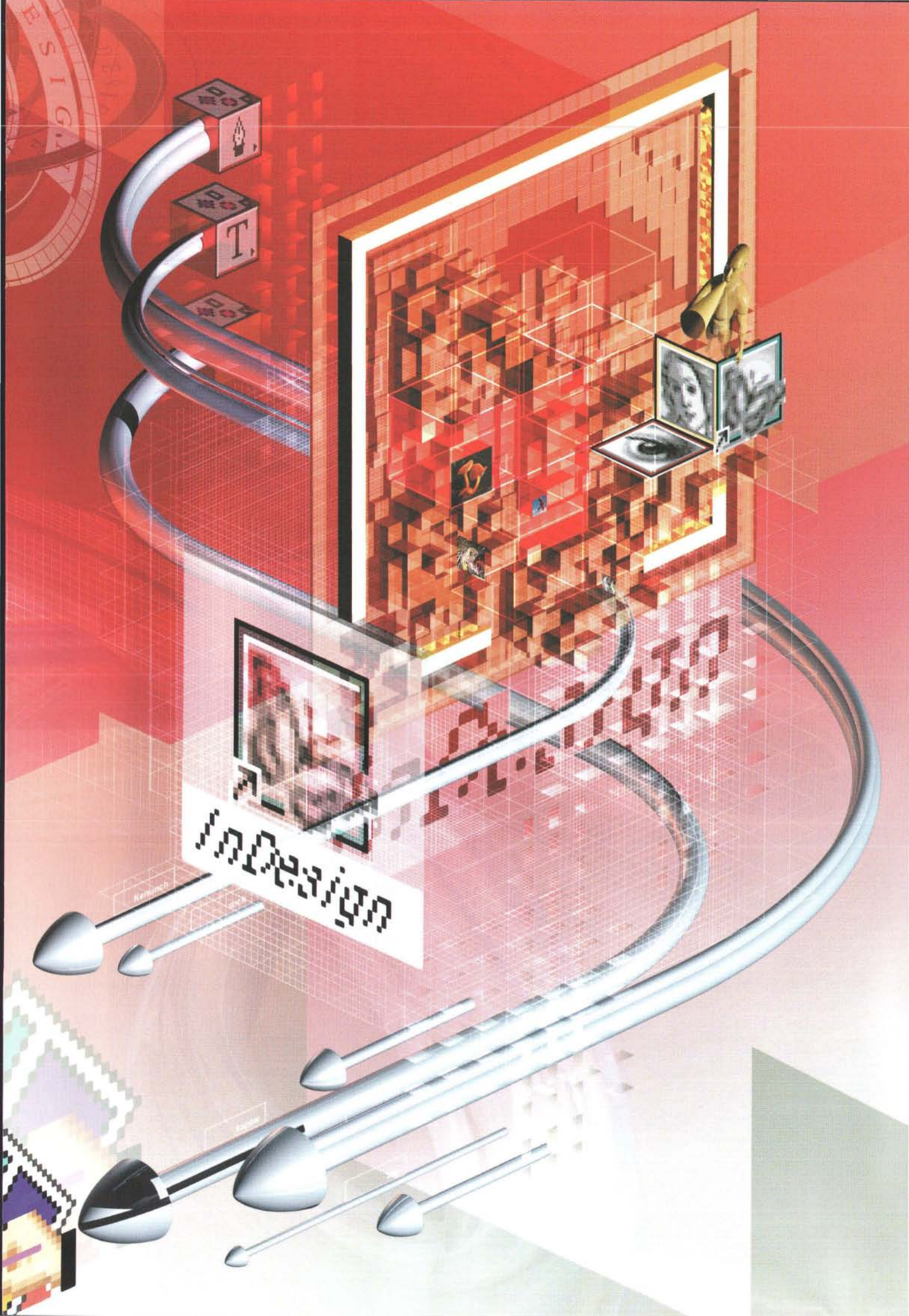


InDepth

Karen Charlesworth examines Adobe's next-generation publishing tool, InDesign.

It's been a long time coming, but finally it's here – Adobe's new graphical desktop-publishing software, InDesign, is about to take its first steps in an expectant pre-press world. The stage is set for a battle between InDesign and Quark's industry-standard graphic design package, XPress. It's a battle InDesign is well-equipped to fight – partly because Adobe is one of the few software companies with the development and marketing resources to offer a truly competitive rival to XPress, but mainly because InDesign itself is a highly sophisticated, fully featured program that does everything XPress can do – and more besides.

InDesign's code has been written from the ground up, taking nothing from Adobe's latter-day page-layout package PageMaker, although much of the basic functionality is the same. InDesign's feature set is both much deeper and much broader than PageMaker's, making it true graphic-design software rather than just a page-layout program. InDesign covers the core disciplines of graphic design – typographic control, and graphics placement and editing – with a comprehensive set of drawing, editing and navigation tools. Peripheral issues, such as colour management, printing and workflow are well supported, often via links with other key Adobe softwares. And layered into InDesign's functionality are hundreds of useful, thoughtfully placed features and devices designed to make life easier for graphic-design professionals.

Toolbox treats

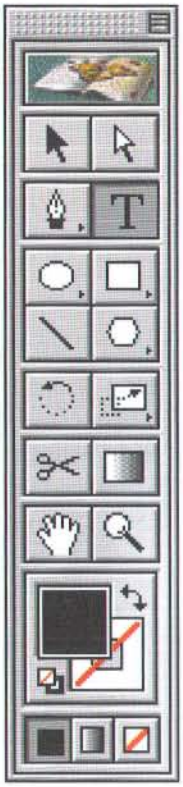
Designers reluctant to invest the time they spent learning QuarkXPress in learning something new are more likely to be persuaded on the grounds that they already have a head start in InDesign. In terms of interface, there's a lot of similarity between InDesign and other Adobe programs – such as Illustrator and Photoshop, which both play a major part in most graphic designers' working lives.

Most of the toolbox tools – pen tool, type tool, rectangle, scale, gradient, scissors, hand, zoom, direct selection and selection – are identical. Much of the interface design is also the same. Creating colours is the same process in all three programs, for instance, and many of Illustrator's drawing functions are replicated in InDesign. And written into InDesign's core code is a handful of features designed to persuade even the most die-hard XPress user to at least consider InDesign. For designers with legacy documents, InDesign includes a document-conversion facility that recognizes and opens files created in XPress versions 3.3-4.0x and PageMaker 6.5. There's also a Keyboard Shortcut Editor: where InDesign's feature set overlaps that of XPress, it's possible to use identical keyboard shortcuts. A special section of the User Guide, titled 'InDesign for the QuarkXPress user', looks at the similarities and differences between the two programs, which acts as a useful grounding for any XPress-trained graphic designer, devotee or not.

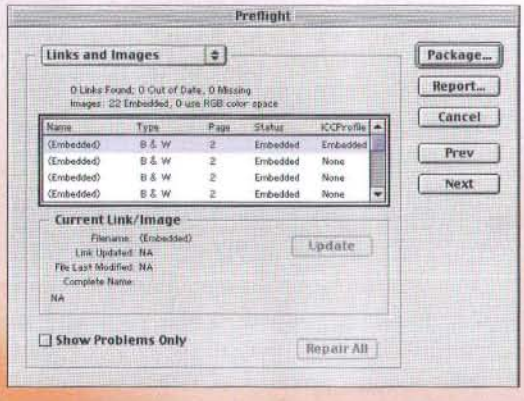
There are strong links between InDesign and Illustrator and Photoshop – with such a strong foothold in the graphic-design market, Adobe would be missing a trick if there weren't. Native PDF and Photoshop files can be placed in InDesign, and through the links palette the original file can be opened for editing in Acrobat, Illustrator or Photoshop. Changes made there will automatically be reflected in InDesign.The exception is Illustrator graphics: when pasted into InDesign, they are interpreted as native InDesign elements that can be modified using any of InDesign's editing tools.

But InDesign's most important link with any Adobe software is its ability to export in PDF format. Graphic-design workflow is rapidly heading towards PDF output, because PDF documents overcome the perennial headaches of documents reproduced from their native format: missing fonts or graphics, reflowed text, displaced clipping paths, re-imported graphics, et al. The Export PDF dialogue box allows users to set font embedding, image quality and optimization thresholds. This includes an option to reduce file sizes by exporting only the sections of placed images that are visible in the InDesign file (leaving out the sections that are cropped out, say by a clipping path).

InDesign doesn't limit the size of your document – you can work with documents up to 5.4m² if the job requires it. The New Window feature is especially useful in this context: it allows you to work on a detail at up to 4,000 per cent in one window while you keep an eye on the overall effect at, say, 50 per cent in another window.



Preflight links and images

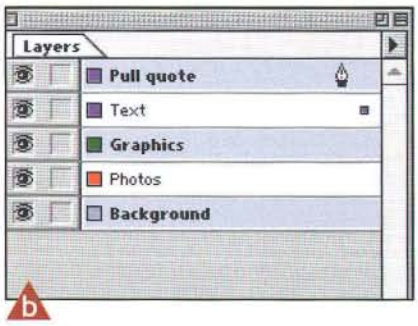


Wave goodbye to your separate pre-flighting controls if you're using InDesign: sophisticated preflighting is built-in. The preflighting facility works with the Links palette, which keeps track of all placed graphics and text. Running a preflight check verifies that all the necessary files are present - reports on colours, inks, fonts and print settings - and 'packages' the whole caboodle for the repro house or printer. You can even produce a 'Printing Instructions' sheet.

Working with layers in InDesign

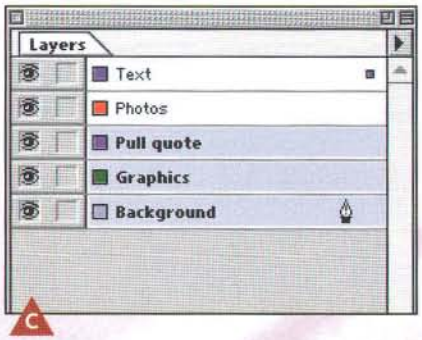
One of the most basic principles of InDesign will be familiar to users of Photoshop: everything is arranged on layers that can be re-ordered, hidden and locked. Working experimentally with graphics and type is made much easier by placing each different element on a separate layer. There are many ways to use multiple layers to speed up the design and print of a document – for instance, designing a series of different-language advertisements can be handled by separate layers within the same documents, with various language text layers being shown or hidden as appropriate. Or text that needs to be proof-read can be isolated on a layer and printed quickly and independently of layers containing graphics by simply turning off the graphics layers – layers don't print when they're turned off.

a



b

Non adjacent layers



c

Re-adjacent layers

1 In a new document, create a new layer (in the Layers palette, click the New Layer icon at the bottom, or select New Layer from the drop-down menu), and enter some text. Double-click on the layer in the palette to get the Layer Options dialogue box and name it 'Text layer'.

2 Create and name several similar new layers – for instance, for a document heading, for graphics, and for a photograph.

3 (a) Using the Direct Selection tool, select the text box on the layer you named 'Text layer'. Now that it's selected, a coloured dot appears at the far right of the layer in the Layers palette. To move this text box to another layer, drag the coloured dot to the target layer. If you have grouped objects on a single layer, dragging the coloured dot will move the group to the new layer.

4 Unlike Photoshop, InDesign allows you to reorganize the Layers palette by dragging multiple layers simultaneously. Experiment by selecting multiple layers and dragging them to different locations in the Layers palette. Hold down the Command key to select non-adjacent layers (b), but beware: if you select non-adjacent layers and drag them to a new location in the Layers palette, InDesign will re-order them to be adjacent! (c)

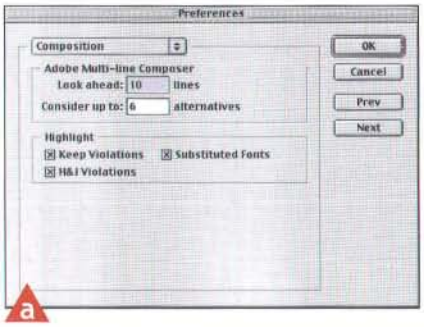
5 To hide or show layers, turn the eye icon to the right of the layers on or off, as in Photoshop. To quickly hide all layers except the selected one, use the Hide Others command in the drop down menu in the Layers palette. Alternatively, you can hold down the Option key and click the eye icon of the layer you want to remain visible – this turns on or off all the other layers at a stroke. The same procedures can be used to lock or unlock layers – use the Lock Others command, or hold down the Option key and click the square to the right of the eye icon.

6 At any point, you can make a group of layers into a single layer, much like the Merge command in Adobe Photoshop, although it works slightly differently. In the Layers palette, select the layers you want to merge, and click any selected layer to indicate that it is the target layer – Adobe InDesign's word for the layer that is specified ready for the next action. When you select a target layer, a Pen icon will appear in the right of the layer in the Layers palette. In the Layers palette drop down menu, select the Merge Layers command. The new merged layer will contain the objects in their previous layer order (nearest to the top of the palette = top of the layer stack).

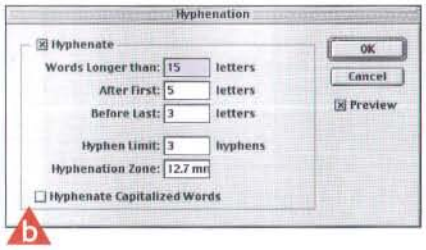
Working with typographic controls in InDesign

For perfectionist typographers, InDesign is a personal nirvana. The kerning and tracking tools offer control to thousandths of an em; tabs can be set to 0.01 point accuracy; and you can position any object to a ten-thousandth of any unit – the choice is between millimetres, picas, points, ciceros, inches, decimal inches, centimetres or you can specify your own units.

If you want InDesign to do the hard work of hyphenation, you have a choice between a single-line composer – which considers the current line's kerning/tracking in isolation – and a multi-line composer, which looks several lines backwards and forwards to give you the best-looking lines with optimally-placed breaks. From there, you can add qualifiers in the Hyphenation dialogue box to fine-tune the paragraph:



a



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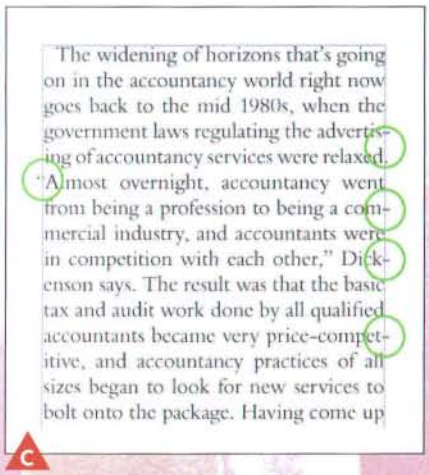


The widening of horizons that's going on in the accountancy world right now goes back to the mid 1980s, when the government laws regulating the advertising of accountancy services were relaxed. "Almost overnight, accountancy went from being a profession to being a commercial industry, and accountants were in competition with each other," Dickenson says. The result was that the basic tax and audit work done by all qualified accountants became very price-competitive, and accountancy practices of all sizes began to look for new services to bolt onto the package. Having come up

c

1 In the Paragraph menu (command-M), choose Adobe Multi-line Composer from the drop-down menu. This sets the specified paragraph to use the default settings for the Multi-line Composer facility.

2 (a) In the Composition Preferences dialogue box (File-Preferences-Composition), specify the number of lines you want InDesign to keep an eye on when deciding on line breaks, and the number of alternative breaks it considers. The higher the value in the 'number of lines' box, the better - you can specify up to 30 lines. Also in this dialogue box, tell InDesign which, if any, violations of your typographical rules to highlight - the deeper the yellow, the more serious the violation.

3 (b) In the Hyphenation dialogue box (choose Hyphenation from the Paragraph palette), set the hyphenation conditions: applicable words specified by character count, insertion zone (after the first X letters, before the last X letters), number of hyphens in a row, a hyphenation zone in millimetres (for left-justified text), and a checkbox for permission to hyphenate capitalized words.

If you've ever done battle with a justified paragraph in which end-of-line punctuation marks and capitalized words make the column edges look ragged, you'll welcome InDesign's 'optical alignment' feature (c). Select the type you want to align, turn on optical alignment (Type-Story-Optical Alignment) and InDesign adjusts the ends of the lines to allow the punctuation marks and other 'optically invisible' characters to overhang slightly. Adjust the overhang amount by tweaking the Base Size field in the Story palette - generally, this should be set to the point size of the type to which it's applied, but you can use a larger value for less overhang and a smaller value for more. It sounds bizarre, but it works - the visual effect on the page is much smoother.

manual kerning

multi-line comp

Kerning and tracking facilities in InDesign can be modified automatically or manually. Manual kerning can be done using metrics kerning - which uses the kerning pairs written into most PostScript fonts - or optical kerning, an InDesign standard default.

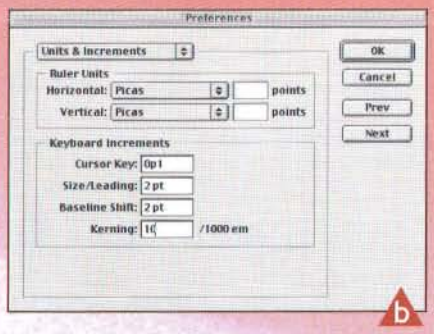
Normally, automatic kerning relies on kerning pairs stored in the font definition that specify the amount of overlap permissible. However, characters from the same font but different sizes, or characters from different typefaces, cannot be kerned in this way.

Optical kerning works the way a designer would, automatically overlapping characters based on their visual appearance. The optical kerning algorithm analyzes the bézier description of the character shapes, stored in the font definition, in order to do this.

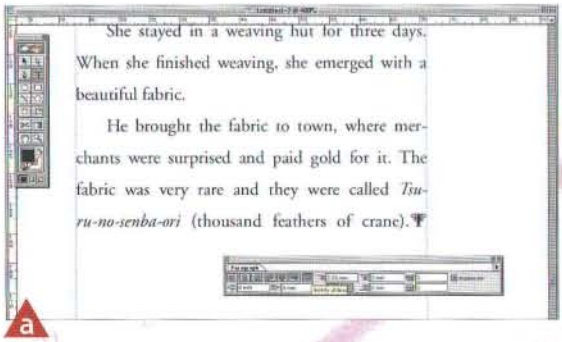
1 (a) To adjust kerning manually, insert the Type cursor between two characters. In the Character palette (Type-Character), set the Kerning menu to a value. Alternatively, you can bypass the Character palette and use the keyboard shortcut of Option plus the left or right arrow key to increase or decrease the kerning.

2 (b) InDesign uses a default kerning increment of 0.02 of an em based on the current type size. To modify this, either, (a) hold down the Control key while using the shortcut above, which multiplies the increment by five, to 0.1, or (b) change the default kerning increment value (File-Preferences-Units & Increments). Once you have changed the default kerning increment, you can still hold down the Control key to multiply your new increment by five.

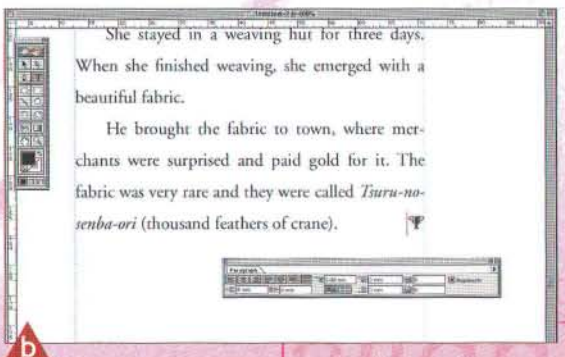
Kerning manually



Kerning increment



Flush space



Flush space

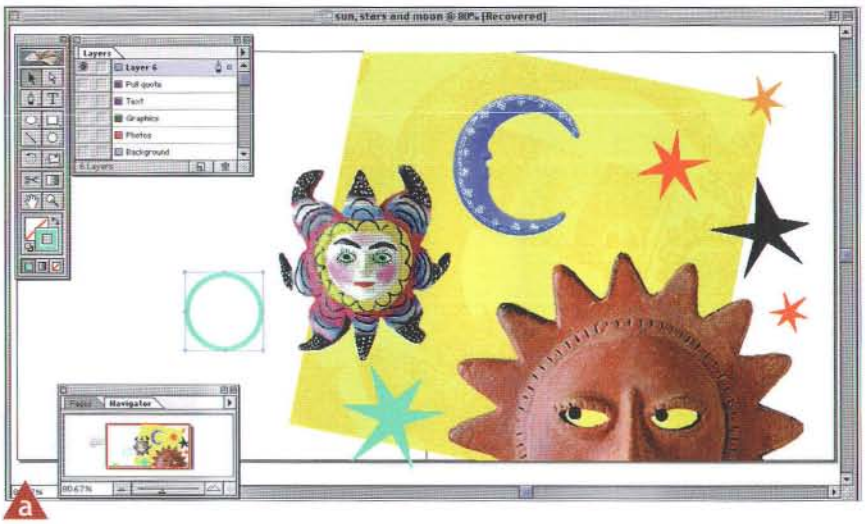
One unique feature in InDesign's typographical controls is the Flush Space. Most magazine articles end with a 'sign-off' character to indicate that the article has finished, and this character is usually aligned to the right of the column. InDesign generates this character automatically:

1 (a) Set the last paragraph to Justify All Lines in the Paragraph palette (Type-Paragraph), and with the Type tool selected insert the cursor between the last full stop and the final character.

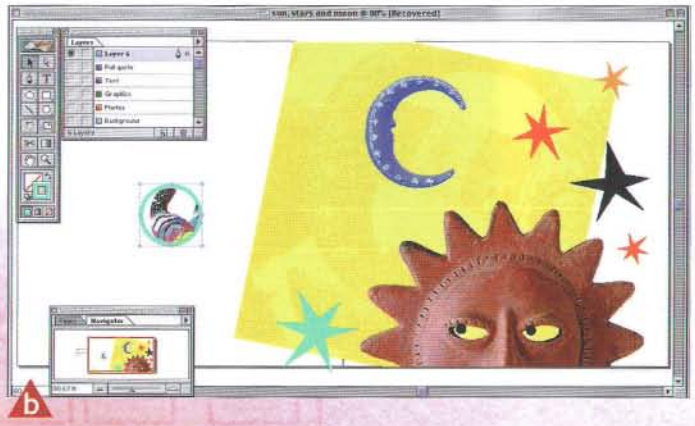
2 (b) Use the keyboard command Option-Shift-Command-J to insert a flush space.

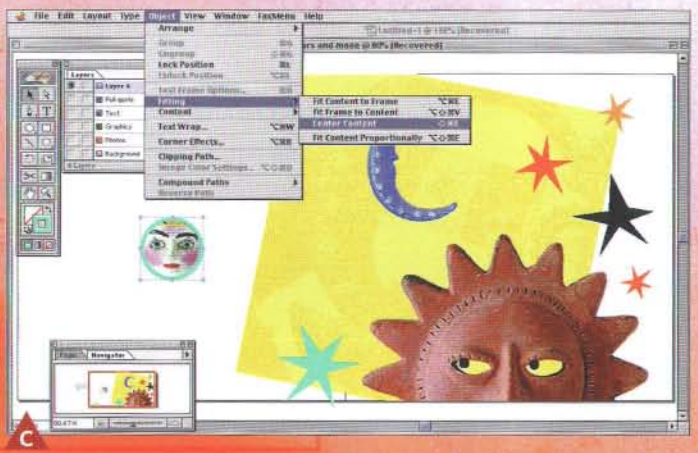
Working with frames in InDesign

InDesign uses a metaphor of frames to organize all the content in a document: every object appears inside a graphics or text frame. In this, it is similar to QuarkXPress, which has all its content appear inside either a text or a graphics box; but InDesign is more flexible than XPress in what it can accept as a frame. Frames in InDesign can be rectangles, ovals, polygons, text converted to outlines, and hand-drawn shapes using the Pen tool. Even frames that begin life as straightforward shapes can be edited into all kinds of bizarre shapes using the Pen tool.



Nesting frames





1 Nesting frames within frames acts as a kind of rudimentary clipping-paths feature and also allows you to create impressive-looking graphics. In this example, a picture of a sun ornament is nested inside a circle drawn with the Ellipse tool and stroked (a). Using the selection tool, the sun was selected and cut (Command-X), and then pasted into (Edit-Paste Into) the circle (b). The top right-hand corner of the sun appears by default in the circle frame, but you can use the Fitting commands (Object-Fitting) to control the area that appears - here, the sun has been centred (c).

2 (d) You can nest as many frames within frames as you want. Here, the picture-file-nested-within-a-circle has itself been nested within a new frame, this time drawn with the polygon tool. Select the nested graphic with the Direct Selection tool – this treats it as a single item – and cut (Command-X) it. Then select the polygon and use the Paste Into command again to place the nested graphic inside the polygon. Use the Selection tool to edit the shape of the circle within which the sun graphic was originally nested.

d

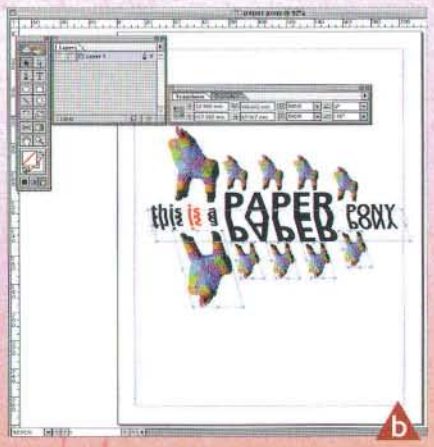
The shearing and scaling tools in InDesign are impressive when applied to frames. You can select multiple text and graphics frames, and apply a shear or scale to all the frames; everything remains editable, even sheared text inside the frame.

a

1 (a) Here, a graphic was placed (File-Place) and a text frame was created to hold the text. Using the Direct Selection tool, both frames were selected and duplicated (Edit-Duplicate).

2 The point of origin was set using the Transform palette (Window-Transform) proxy on the left hand side – in this case, the bottom middle – and Flip Vertical was selected from the Transform palette drop down menu. The two groups of objects were aligned using the Direct Selection tool.

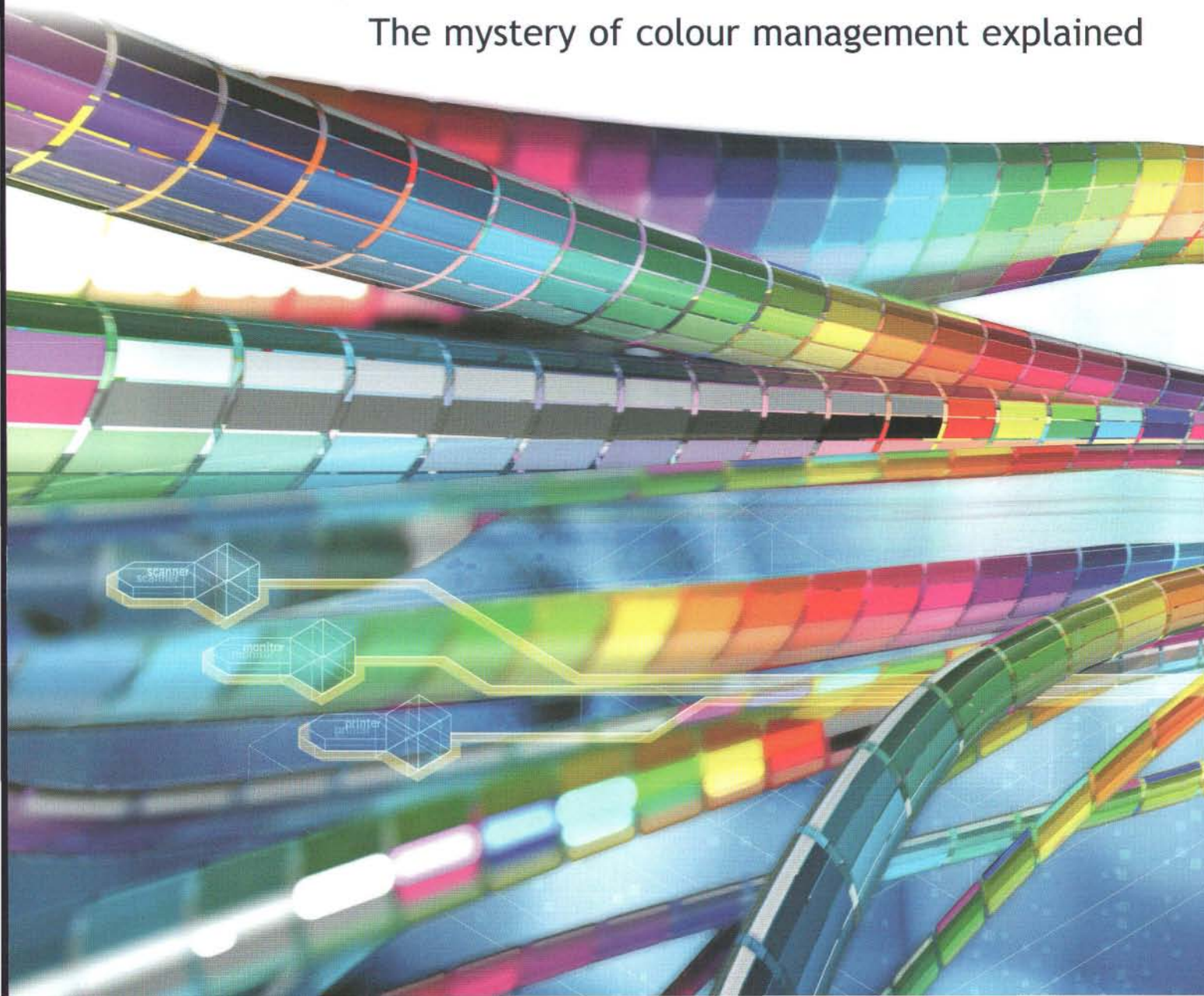
3 The bottom group of objects was selected using the Direct Selection tool. Using the Shear tool in the Transform palette, a value was entered to shear the group (b). Alternatively, you can select the Shear tool from the toolbox and drag any control handle to shear 'manually'.



b

Seeing the right colours

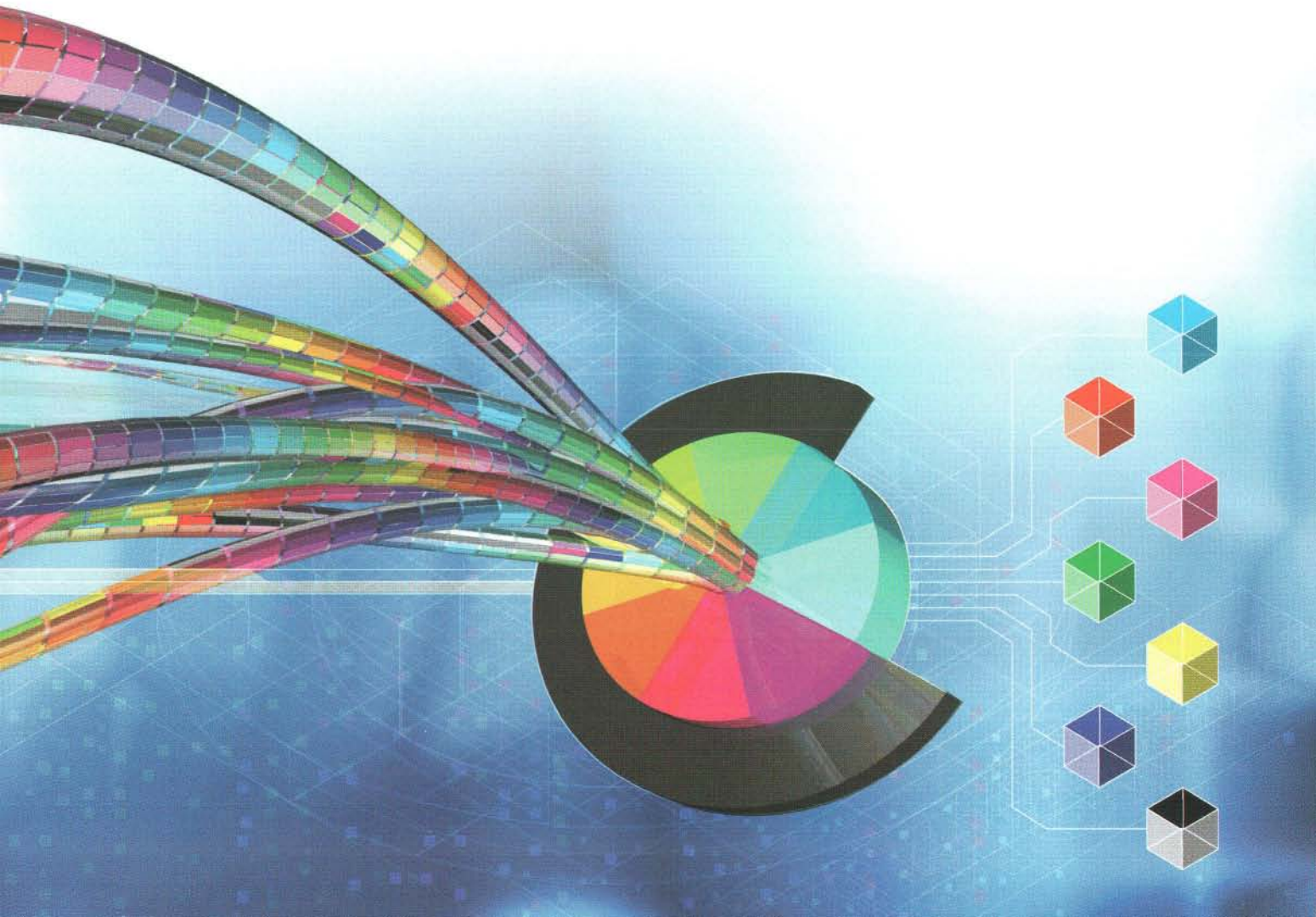
The mystery of colour management explained

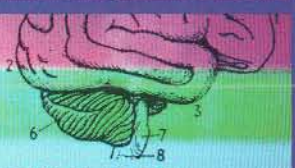


Colour is a difficult phenomenon to control, not only because most of us have to work with at least two colour systems – CMYK and RGB – but also because the human eye is connected to a human brain. The way individuals perceive colour combines two processes: the response of the eye's receptors to different frequencies of light and the interpretation by the brain of the electrical signals generated by these responses. There are also weird effects linked to the viewing environment such as *metemerism* where two different-coloured objects can appear the same colour under certain lighting conditions. Colour scientists have been trying to bring some sense and control to colour for the graphic-communications industry, but when you hear terms like *black body radiation* and *tristimulus response*, would you believe us if we told you it's not 'rocket science'?

We hope to explain how to apply colour management in a practical way that will save you hours. If you currently have to do a lot of colour-balance adjustments in Adobe Photoshop or need to scan images several times to get a decent result in print, read on.

Let's face it, the whole process of bringing a piece of graphic-design work to reality on paper, CD-ROM, or Web is fraught with colour-management pitfalls. For a start, what the designer sees on the Macintosh screen is RGB: a combination of red, green and blue light that together make up white light. But when the design with its vibrant colours is sent off to the printers, you get back sheets of paper printed using a CMYK process: a combination of cyan, magenta and yellow pigments that combine to give you black. So the first fundamental problem in colour management is that you get a different range (or gamut) of colours with RGB displays than you do from a CMYK printing press. Designers have had to work with this limitation for years, but they have got around the



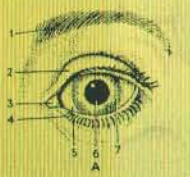


What is CIELAB?

The CIE part stands for Commission Internationale d'Eclairage – an international research body founded in 1913 under the initiative of a French gas company to study the components of daylight in an attempt to simulate it with gaslight. CIE continued to study colour perception and CIELAB colour space was defined in an attempt to model human colour perception.

A quick biology lesson: the retina of a human eye has many sensors called cones. There are actually three sets of cones, red ones, green ones and blue ones. Each type of cone is particularly sensitive to that component of colour and generates an electrical response which is passed by the optical nerve to the brain. Some scientists of the CIE evaluated the responses from a sample of people to different colours and defined what in known as the "standard observer". From this, the scientists defined several colour spaces that described the colours visible to the human eye. The most widely used in graphic arts applications today is CIELAB.

L, A & B are the three components that were defined to describe human colour perception. L is lightness or relative luminance while A and B are the coordinates which describe the colour. A is Red minus Green and B is Yellow minus Blue. You sometimes see LCH mentioned. LAB and LCH are essentially the same thing. A & B tell you where a point in colour space is along two axes, while C & H describe the same point using polar co-ordinates, C (Chroma) and H (Hue angle). (Go back to your GCSE maths books for a fuller explanation.)



problem by working in CMYK colour space; eg. scanning pictures to CMYK.

But it's not that simple. The same CMYK information can look different on different printing presses. A commercial sheetfed offset press can produce a wide range of colours, but a large web press printing on newsprint produces very different results because it has a smaller colour gamut. Your client's logo can appear as two completely different colours in a glossy brochure and in a newspaper advertisement.

These problems also happen in the studio. You can try this yourself. Open the same scanned image in Photoshop on two machines with the monitors side by side. Are the colours different? Next, print out the image from both machines to the same colour laser printer. Compare the results. Now hold the printouts next to the monitors. What you see on the screen is often not what you get.

At least help is at hand. Now that we work in a predominantly digital world, colour-management systems can be created that have clever computer programs to work out how to convert the RGB information of a scanned image to the range of RGB colours that can be displayed on a monitor. They then map it into the CMYK colour space of a proof printer or press. Apple's **ColorSync** is one such system. The majority of popular graphic-design and layout packages are now ColorSync aware, but if you have an older version of the application, you will need to upgrade it or purchase plug-ins for colour management.

A device-independent colour space was adopted to enable these programs to make the necessary calculations – **CIELAB** (see left for more info). Essentially, CIELAB represents perceived colours and points in the colour space, defined by three independent co-ordinates. The advantage of CIELAB is that it is device independent and perceptually uniform. Numerical differences of the L, A & B values in CIELAB colour space correlate with differences in the colours seen by the viewer.

Next, you need some way to tell ColorSync specific details of the scanner, monitor or printer that your have in your studio so that it knows how to manipulate the colour data. The standard format that has emerged is the **ICC profile** created by the International Color Consortium (ICC) made up of all major graphic arts hardware and software manufacturers. An ICC profile is like a conversion table that translates RGB or CMYK data into or from LAB data. During the translation process, the profile also takes into account the behaviour of the device that has created or is outputting the data.

An ICC profile describes the colour-rendering abilities of a particular device, whether it's a scanner, digital camera, monitor, printer, or press. The profile defines the gamut or colour range of a device, plus how the device distorts colour. ICC profiles make it possible to describe the capabilities of devices from countless different vendors in a standard, portable format.

The profiles work in conjunction with the other two components of colour-management systems: the engine, or colour-management method, which relies on the profiles to translate colour from one device to another; and the application programs in which the profiles are embedded (such as Adobe Photoshop) or applied (such as Adobe Illustrator, Macromedia FreeHand, QuarkXPress, and Adobe PageMaker).

Adobe InDesign can read profiles in placed images, as well as reading profiles stored in imported pageMaker or XPress 4 documents. The chosen profiles are embedded in the InDesign document, to maintain colour integrity if the document is moved to another computer. InDesign can also embed ICC profiles into an exported PDF file.

For most people trying to adopt colour management, the big problem today is creating the profiles themselves. You can use the generic profiles provided by a hardware manufacturer (often downloadable from a Web site), but they are based on a perfectly calibrated device as it rolls off the assembly line. In the real world, custom profiles – created by a specialized colour-profiling package – are essential to ensure best results.

Before we go into more details about how to create ICC profiles, there are a few important environmental issues to consider. Not the sort of issues that concern Greenpeace, but they should concern any colour manager.

Have a look around your office. Colour is everywhere, not just on your monitor or printout. If your studio walls are painted bright yellow, it's going to affect what you see on your monitor. The same goes for the clothes you wear. If you are serious about colour management, you've got to go for neutrals like beige and grey. You think we're joking? A creative agency was wondering why all their work came out with an orangey cast. It turned out that the creative department had a ceiling to floor mural behind their

InSync Seminar

Now you have read this supplement, go to the free InSync Seminar to pick the brains of experts across the industry on the new workflows that will change the future of publishing. Great minds from Adobe, Apple, Macworld and Hewlett-Packard have come together to show you a wider range of layout opportunities with Adobe InDesign, finer colour management with Apple ColorSync, and a method of ensuring greater accuracy throughout with Adobe PDF. And for good measure, Hewlett-Packard will introduce you to much more affordable ink-jet printing with Adobe PressReady and something extra that is very new.

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HEWLETT PACKARD
Expanding Possibilities

desks of a lush, green rain forest. Everything on their screens had a green tinge so they were making everything more orange to compensate.

If you have a viewing booth with a standard daylight source, check which daylight standard bulb is fitted. D65 was a standard traditionally used by printers, but today, the graphic arts standard is D50 which is closer to sunny daylight.

Now we can start creating ICC profiles for the equipment. This is a two-step process: **calibration** and **profiling**. At a recent Seybold conference on colour management, one of the top problems cited by colour experts is that people confuse calibrating and profiling. Essentially, you start off calibrating all your equipment: scanners, monitors, proof printers. Calibration means simply to set up each piece of equipment to known specifications and constantly checking that the specs do not change. Some pieces of equipment are easier to calibrate than others; some are auto-calibrating; and some, for example a simple colour laser printer, cannot be calibrated at all.

Monitor calibration is essential. Ideally, every monitor in a studio should be calibrated, and twiddling with brightness and contrast knobs absolutely forbidden once calibration is set. There are some useful tools on the market that simplify this calibration process (see left). The advantage of using these tools is that once all your monitors are calibrated to the same standard, they will all be very close in dynamic range and colour gamut.

The next step is to profile your equipment. For input devices, you use a **target** (a set of colour patches of known colour value) that you scan or capture. The colour information that your scanner creates for each colour patch is compared to the known values, and the relationship between the two sets of values are recorded by the profiling software.

For output devices, you have a set of colour values that you send to your device for output. You then use a **colour-measuring device** – a colorimeter or spectrophotometer – to measure the colour values of the output and again record the differences. You can profile your monitors, proof printers and your printer's presses.

There are many different tools available for profiling equipment. The most sophisticated can represent a sizeable investment. However, there are a growing number of companies offering colour-management consultancy services who have all the necessary tools for building colour-managed workflows.

Now you have all the components needed to build a colour-managed workflow (see diagram right) except for one thing – training. Successful colour management requires organized work practices and trained staff to implement them. Regular routines include recalibration of equipment – this could be daily for monitors, weekly or monthly for other devices. Applying the right ICC profile at the right stage is, of course, essential. If you use different paper stocks for proof printing, there will be a separate ICC profile for each type of paper. Therefore, the ICC profiles need to be easily identifiable.

Many popular graphics packages including Adobe Photoshop 5.x, Illustrator 8.0 and InDesign, as well as QuarkXPress 4.x are ColorSync-aware, but you still need to learn how to utilize the colour-matching features. The most common format is a set-up window that allows you to select input profiles and output profiles plus the type of colour-matching styles you want to apply. Typically, the colour-matching styles are *photorealistic* or *perceptual* (for images), *colorimetric* (for logos), *saturation* (for graphics and illustrations) and *absolute* (for proofing).

If all this sounds like a control freak's paradise to you, where is the payoff? There is a growing band of design studios, creative agencies, repro houses, publishing houses and, increasingly, printers, who have gone down the colour-management route. A couple of brief case studies can be found at the end of this article.

Neat tricks

Emulating contract proofers on a digital printer – you can create an ICC profile that describes an analogue proofing process – such as Cromalin – so that you can emulate an analogue proof when outputting a job to a digital colour printer.

Remote soft proofing – if your client's monitor can be calibrated to the same specifications as your studio monitor and you can apply the same ICC profile for the monitor, you can ensure that the colour viewed by the client is the same as the colour on your monitor. Instead of biking a proof to your client, you can email or ISDN the file to the client for viewing. To add an extra refinement, you can apply the ICC profile of the press so that the colours on the screen are the colours that will appear in print.

Monitor Expert Calibrator

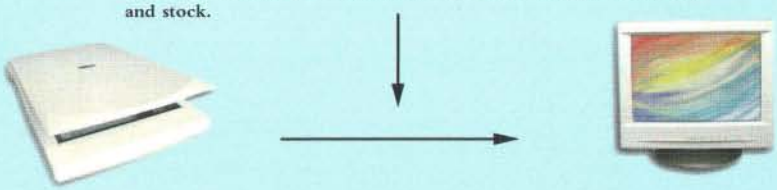
We all use the monitor to view graphics, so calibrating and profiling your studio's monitors is a high priority for colour management. A monitor is unstable and the intensity of the output deteriorates with time, making it more important to calibrate frequently. Brightness and contrast are very important parameters that determine the black (zero output) and white (maximum output) points of the monitor colour space. They need to be set accurately using real measurements, not by eye and guesswork. The monitor also has a characteristic Gamma that defines how the output behaves between the black and white points. To take the hard work out of the calibration process, some monitor manufacturers have built self-calibrating monitors, but where does that leave the rest of us?

A tool developed by Alwan Color Expertise achieves accurate monitor calibration and profiling with only a few mouse clicks (and knob twiddles). The Monitor Expert Calibrator (MEC) comes complete with a spectrophotometer with a suction cup that attaches to the screen. The software is ColorSync compatible and can be launched directly from a control panel. It takes you through the adjustments to the brightness and contrast controls to calibrate the monitor, then automatically generates ICC profiles according to your application needs. The MEC also allows you to measure ambient lighting levels and their onscreen effects. It warns you if the conditions are not ideal. A black monitor hood is supplied with the MEC to create the best viewing conditions for the monitor.

Once the MEC is installed and you have completed the first full calibration and profiling cycle, regular recalibration checks can be added to your normal work routine. There's a neat trick to check the accuracy of your monitor set up for working in Photoshop. You can measure the LAB value of a colour using the eyedropper tool and compare it to the LAB measurements from the MEC spectrophotometer. The values should be identical. There are other monitor calibration and profiling tools available from Barco, Candela, Gretag Macbeth, Pantone and quite a few others.

Your ColourSync workflow

Press is set up and calibrated for optimum contrast and density. Profile test chart is then run at optimim settings for stock and press. Target is measured and an accurate ICC Profile is created for press and stock.



Scans are made using calibrated settings to ensure consistant, maximum quakity results. Scans are embedded with a custom ICC Profile to define source in the workflow. Scans are then sent into workflow with profile attached.

Images colour matched from scanner to RGB working space, giving the user accurate representation on a calibrated monitor. Documents then finalized on a workstation using Colour Management.

Digital proof is sent with controlled plates to the print room along with press reference. Press operator checks data sheet and runs final print job to specified densities and if desired, cross-references with a digital proof.

Using custom ICC profiles of calibrated proofer and final press, user outputs accurate proof of final printed result. Customer signs off as final proof which is sent to press room with ICC density spec.

Pitfalls

Unstable devices – be aware that some devices – particularly monitors and laser printers – behave differently during the course of a working day. These devices take time to warm up at the start of the day. Monitor output will gradually decrease during the day. New toner cartridges in a laser printer will also make a significant difference to the output.

Monitor ageing – you may need to replace some of your monitors to be able to work with colour management. The figure to measure is maximum luminance of the monitor, measured in candelas per square metre or cd/m^2. If it falls below 70 cd/m^2, it won't be able to display a neutral white and the full range of colours.

Colour management for Windows – colour management tools for Windows platforms is way behind that for Macs. Because there's such a variety of video architectures for PCs from different manufacturers, there is no standard way to calibrate monitors.

Information

Where to get more information on colour management

Apple Publishing & Digital Media Alliance
A dedicated team of Apple accredited resellers who specialize in serving the graphic-communications industry. Alliance members have invested in colour-management training, device calibration and profiling tools to demonstrate, advise on and implement colour-management solutions.

For a list of Alliance members with colour-management expertise, contact Apple or check the Macworld monthly Reseller Guide.

Alwan Color Expertise
Alwan Color Expertise was founded by Elie Khoury to provide consultancy, systems implementation, engineering and training services exclusively dedicated to colour management. Elie is a consultant to Apple for ColorSync implementation. His company has integrated colour-management systems based on ColorSync and ICC profiles in over 20 European and international companies. Elie was *Macworld*'s colour guru for the purposes of this special report.

Also lending his colour brains to this *Macworld Report* was Andy Brown of Alwan Color Expertise. From his 12 years in pre-press, Andy recognized the problems of colour accuracy for printers and has followed the development of Apple ColorSync as a colour-quality control solution.

Contact Elie Khoury by email : ALWANCOLOR@aol.com
Contact Andy Brown by email : Andy@colour-management.co.uk

CASE STUDY

What's up, Doc(ument)?

by Elie Khoury - Alwan Color Expertise

Proprietary vs standard colour management

Proprietary colour-management systems talked big and promised much – before being abandoned by frustrated and deceived operators in the early 1990s.

Since then, things have been changing, slowly but surely and in depth.

In 1993 the ICC (International Color Consortium) was founded to establish graphic-arts vendor-independent standards.

In 1995 an ICC format file – called an ICC profile – was the first cross-application and cross-platform description of the colour capabilities of a given device.

At the same time, Apple Computer integrated into its Mac OS a system-level colour-management architecture called ColorSync 2.0. This enabled any Macintosh user to achieve consistent, predictable and reproducible colours.

Any Macintosh user? Yes, provided the following two conditions are met:

- Workflow devices must be calibrated and profiled, and
- Applications must be ColorSync and ICC aware.

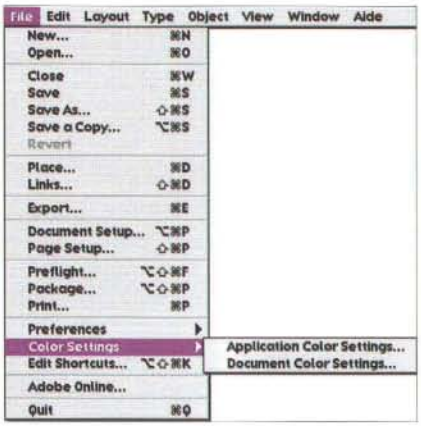
Colour-management believers have waited patiently – some less so! – since that time for applications integrating ColorSync and ICC support.

Some developers have integrated partial ColorSync support in their latest upgrades. And some have built-in better support, by following Apple and ICC recommendations and guidelines.

Adobe InDesign's colour-management settings

Now, Adobe has released its next-generation graphical DTP program, InDesign. And I was keen to investigate its level of ColorSync support and much-vaunted colour-managed PDF workflow.

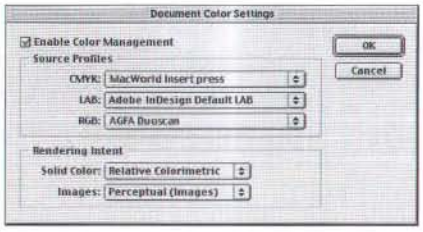
Adobe InDesign has three basic



File/colour settings

dialogue boxes that need to be set according to your workflow and to the required operations. (see screenshot below)

Document colour settings



Enable colour management: First, switch on Adobe InDesign's colour-management support. This is done by activating the Enable Colour Management check box.

Source profiles This is where you specify the default devices' ICC profiles for generating your documents' images.

In our workflow, the settings were as follows:

CMYK: Macworld Insert press profile. This is the separation profile used in Adobe Photoshop to produce CMYK images.

LAB: Adobe InDesign Default LAB. We had no reason to choose another LAB profile.

RGB: Agfa DuoScan profile. Originations were scanned on this scanner, and imported in RGB mode.

Rendering intent Rendering intent determines the way colours are calculated and mapped from a source-device colour gamut to a destination-device colour gamut.

Colorimetric intent will preserve colorimetric matching from one device to another.

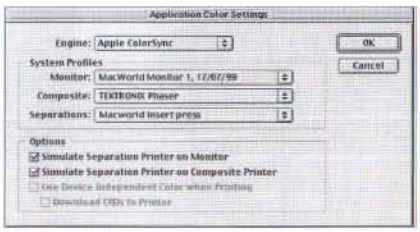
Perceptual intent will preserve appearance or global harmony matching.

We chose as a default rendering intent:

- Relative colorimetric for colours, and
- Perceptual for images.

These are the standard recommended choices.

Application colour settings



Engine The engine – or CMM (Color Management Module) – is the piece of software calculating colour values in a colour-mode change operation.

We chose the Apple ColorSync engine, which is the default Mac OS CMM.

System profiles These are simply the profiles of the devices used.

Monitor: Macworld Monitor1, 17/07/99. This is the monitor profile. Our monitor was calibrated and profiled daily with Monitor Expert Calibrator (MEC). This information is updated automatically by the MEC via ColorSync after each calibration.

Composite: Tektronix Phaser. This is the digital printer or proofer profile.

Building a colour-managed workflow from digital acquiring to press may seem an impossible task for some, a vision of mind for others or, for the optimistic ones, a noble but very difficult goal to achieve.

Over the last few years, many have tried, but very few - if any - have succeeded. So, is colour management a realistic project today?

For this *Report*, we used a Tektronix Phaser 840 printer profiled with X-Rite DTP-41 spectrophotometer and LOGO Profilemaker Pro software. Phaser ICC Proof software was used to load the printer and press profiles into the RIP in order to reliably proof the web-press output.

Separations: Macworld Insert Press. This is the press profile. This insert was printed on a Komori web press at Jarrold Printing. The press was profiled with GRETAG Spectroscan and LOGO ProfileMaker Pro. Its profile was used for the CMYK separation of this insert images.

Simulate Separation Printer on Monitor: This option allows you to discover one of the most powerful capabilities of colour management with ICC profiles: *Soft-proofing*. Choosing this option will tell InDesign to display printed colours, using the press ICC profile to simulate press gamut and even paper white on the monitor.

Simulate Separation Printer on Composite Printer: This option allows you to discover another powerful capability of colour management with ICC profiles: *Hard-proofing* (without curve tweaking).

Choosing this option will tell InDesign to print the press-output colours on your printer, using the press ICC profile to simulate press gamut and even paper white on your digital printer.

Choosing different ICC-output CMYK profiles allowed us to soft-proof and hard-proof the colour output for different paper types. This is invaluable when predicting colour rendering of different substrates.

Illustration on low-grade paper

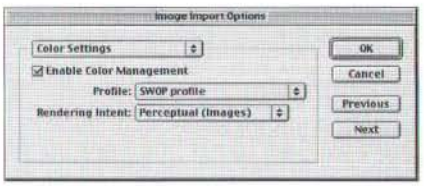
... on high-grade, wood-free paper

Image import options

In a colour-managed workflow, each file is generated by a device (a scanner, for example) or by a profile (a CMYK separation, for example).

Every time you import an image file into the program, you should tell InDesign the file source device or profile. This will give the software the ability to calculate the right colours for display and printing.

You can also choose a rendering intent for each imported file.

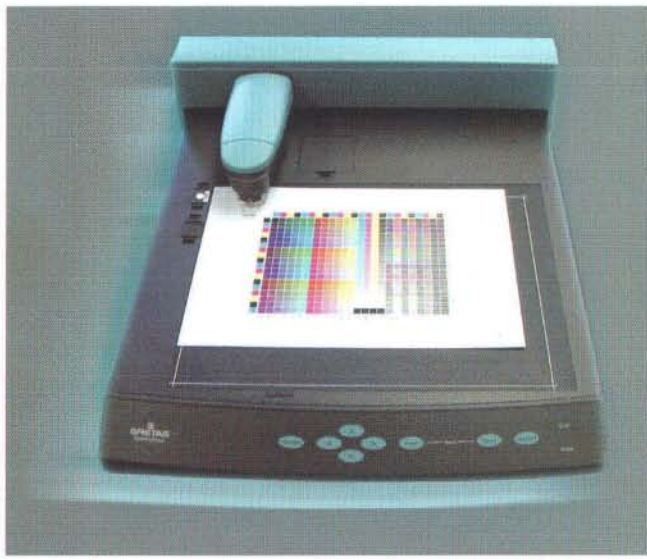


Default choices will use the document colour settings source profiles and rendering intents.

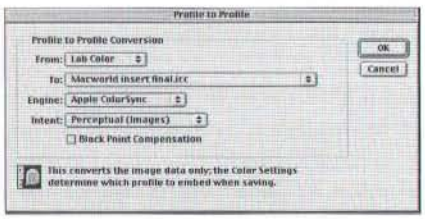
Colour management with InDesign and Photoshop 5.0

Colour management with Adobe InDesign will help DTP operators design more efficient colour-management workflows.

They have the choice of keeping images in their original colour mode – RGB, CIELAB, CMYK – importing them with their corresponding profiles,



The GretagMacbeth Spectrolino spectrophotometer reads reflective, emissive and transmitted light. A single unit is all that is required to characterize both colour output devices and monitors. For the automation of fast, error-free colour reference values, you can mount a Spectrolino spectrophotometer on a SpectroScan automatic x/y table (above).



and embedding all this information in the PDF file. They can also convert images to the output process colours using Adobe Photoshop 5.x's excellent ColorSync and ICC support. This would avoid possible RIPping errors on non-ICC-aware RIPs.

So, is colour management a dream or reality?

More than 30 European companies are making substantial profits because their publication colours are consistently predictable and reproducible thanks to professional colour management.

What about you?

Mac OS X embraces PDF

Adobe and Apple see graphic qualities of Quartz

Apple's announcement of Quartz, a new imaging and windowing layer for Mac OS X that will leverage Adobe's Portable Document Format, should reassure any users concerned about Apple's continued commitment to its traditional core of graphics and publishing professionals.

Quartz (see *Macworld*, July 1999) replaces OS X's OpenStep-based Display PostScript technology – another Adobe invention – with capabilities that employ and expand on PDF, a format that is fast becoming the de facto standard for heavy-duty publishing workflows. Furthermore, Apple's decision to augment systemwide PDF with native support for compositing and alpha channels should give a potent boost to third-party graphics and multimedia development under Mac OS X, now due to ship early next year.

Of those third parties, none is more important than Adobe itself. Besides inventing PDF, Adobe is the industry's premiere developer of the sort of graphics applications Quartz was born to run. Adobe has pushed PDF with revs of all its current software; now, with the release of InDesign, the company's eagerly awaited next-generation page-layout application (which will feature extensive support for PDF-based publishing workflows), PDF will become even more vital to Adobe's interests.

What sort of an edge will Mac OS X's native PDF support provide Macintosh users of Adobe software? On the face of it, the tighter integration of the OS and graphics applications appears to herald performance gains and new features that can't be matched by Windows versions of PDF-savvy applications.

These advantages remain speculative, however, since Adobe has yet to articulate publicly the benefits Quartz will provide its Macintosh users. Company officials have told *Macworld* that they are enthusiastic about Apple's strong support for PDF.

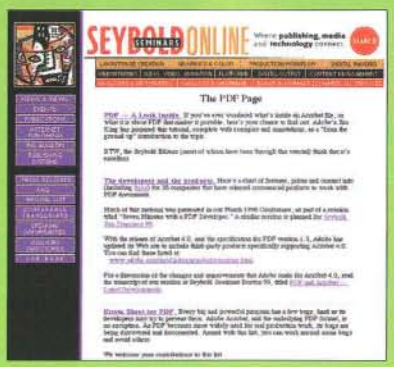
"New innovations like Quartz are possible because PDF is an open, publicly documented file format," said a spokesperson.

"Apple's announcement is an endorsement of the value inherent in Adobe PDF. Adobe has maintained a strong relationship with Apple over the years, and will continue to work with the company in future technology developments," he added.

A clearer statement of Quartz's place in Adobe's product roadmap would be a boon to pro graphics users who have come to depend on both Adobe and Apple and who are glad to see their relationship gain new vitality.

PDF on the Web: top resources for tools and info

PDFZone.com (left) features an extensive library of tools for creating, editing, managing, and converting PDF documents. Also included on the site are prepress tools and utilities - and a Developer's Corner that answers the burning question: "What is PDF?" **www.pdfzone.com**



From the people at Seybold Seminars, this is the place to go for PDF white papers and Seybold presentations. The site also offers a handy chart of PDF developers and their products. The site includes a tutorial by Adobe's Jim King, complete with examples and annotations, as a "from the ground up" introduction to the topic.

There's also a chart of features, prices and contact info (including links) for 38 companies that have released commercial products to work with PDF documents.

For a discussion of the changes and improvements that Adobe made for Acrobat 4.0, you can read the transcript of the session at Seybold Seminars Boston 99, titled "PDF and Acrobat - Latest Developments".

An Errata Sheet for PDF lists bugs as they are discovered. You can also add your own contributions to the list. **www.seyboldseminars.com/News/Front/PDFday.html**

Planet PDF (above) is a repository of PDF news, advice columns, and interviews with PDF gurus such as Adobe Acrobat engineering manager Carl Orthlieb. Samples of code for enhancing Acrobat are also available at this site. **www.planetpdf.com**

Pure PDF (above), sponsored by Web publishing vendor Glyphica, goes beyond news and announcements to include PDF tips and tricks, and examples of Acrobat in action. **www.purepdf.com**

With the release of Acrobat 4.0, and the specification for PDF version 1.3, Adobe has updated its Web site to include third-party products specifically supporting Acrobat 4.0. You can find these resources listed at **www.adobe.com/prodindex/acrobat/resources.html** (above).

The Print Week PRISM Awards 1996
Consumer Magazine Printer of the Year
Catalogue Printer of the Year

JARROLD

Printing World Awards 1998
Computer to Plate Production Award Winner

Your partner for catalogue production

At Jarrold Printing we regard catalogue production as our speciality – and so do our customers:

- Pioneers in the use of four colour CTP production, bringing cost and schedule savings to catalogue producers.
- Extensive PrePress facilities including database management, image storage, manipulation and colour reproduction.
- Presses specially developed to run thinner lightweight uncoated catalogue papers without compromising running speeds and print quality.
- One of the most comprehensive binderies in Europe capable of producing over 2 million perfect bound and 2.5 million wirestitched catalogues each week.
- Facilities for in-line mailing, personalisation, selective and co-binding, offering catalogue producers further options for customer targeting.
- Long-term partnerships with US companies launching in Europe.
- New 16pp press further extends our offering to catalogue customers with the capability for special colours, spot and UV varnish and differentiating fold formats delivered in line.

These are some of the key features which have led to Jarrold's award-winning reputation in the catalogue market.

For more information on what makes Jarrold Printing special please contact Joanne McDonagh at:

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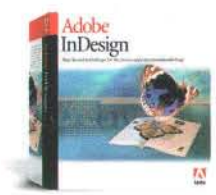

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